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AN EVALUATION OF
INDUSTRY SAFETY MANAGEMENT
IN EASTERN CANADA
OFFSHORE DRILLING OPERATIONS

Submitted
to
ROYAL COMMISSION ON THE
"OCEAN RANGER" MARINE DISASTER

MANADRILL DRILLING MANAGEMENT INC.

JUNE 1984

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June 14, 1984

Royal Commission on the
Ocean Ranger Marine Disaster
P.O. Box 2400
Fort William Building
St. John's, Newfoundland
A1C 6G3

Attention: Mr. R.G. Dyck, Studies Manager

Re: Industry Management of Regulations

Dear Sir:

We are pleased to submit our final report entitled "An Evaluation of Industry Safety Management in Eastern Canada Offshore Drilling Operations".

The study describes the Industry's activity base and the physical and business environment in which Industry operated during 1982 and 1983. The policies and procedures of the Operators and Drilling Contractors are evaluated and a number of concerns or weaknesses identified. Recommendations are provided which should assist Government and Industry in identifying practical means of improving the safety of offshore operations.

Manadrill Drilling Management Inc. was assisted in the preparation of this study by the following associates: W.E. Russel and M. Gillingham of National Petroleum and Marine Consultants Limited and G.J. Purcell of Marine Resource Consultants Limited.

This has been an interesting and rewarding study and we have enjoyed working with the Commission in its preparation. We trust that the information is of interest and that our recommendations will be of assistance to the Commission and to the Industry as a whole.


Very truly yours,
MANADRILL DRILLING MANAGEMENT INC.

Wilson E. Russell

for Ronald J. Bell
President

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EXECUTIVE SUMMARY

The Royal Commission on the Ocean Ranger Marine Disaster has called for a number of studies to "inquire into, report upon, and make recommendations with respect to" a number of safety issues related to the marine and drilling practices and procedures utilized by Industry in offshore drilling operations.

The objective of this study is to assess critically the method used and the degree to which Operators and Drilling Contractors regulate the safety of Eastern Canadian offshore drilling operations.

A detailed questionnaire was developed and sent to all Operators and Contractors with activities in Eastern Canadian waters during 1982 and 1983. Following receipt of a number of formal responses to the request, a series of interviews were conducted with those companies to amplify the data base. The study team also held meetings with the prime Regulatory Agencies.

The study emphasis was directed toward an objective evaluation of the offshore drilling Industry's ability to conduct operations in a safe and efficient manner within the framework of the regulatory regime imposed by the Government Agencies. The areas of specific interest included well control, lifesaving equipment and procedures, marine emergency training and marine procedures.

The organizational structures of the Operators and Drilling Contractors were reviewed along with the contact relationships between Industry and the Government Agencies.

The eastern Canadian operating environment is complex, everchanging, physically hostile and politically sensitive. In the time covered by the study period a large number of changes have taken place in this environment. Governmental agencies have undergone major organizational restructuring and many new functional departments have taken a sudden interest in the control of the offshore industry. The industry itself has made a transformation from the predominance of the multi-national, major Operators and large established multi-rig international Contractors to the new Canadian independent Operators utilizing a group of new Drilling Contractors with a complete range of equipment types and a variety of operating styles.

The large variations in the physical environment that characterize east coast offshore operations dictate the use of a wide range of equipment and operating procedures, and tend to increase the requirements for extensive and specifically tailored safety contingency plans. The Industry operates in one of the world's most complex and hostile environments and as a result must place a high degree of emphasis on safety.

These internal and external pressures have a tendency to complicate the Operator's environment and his ability to control the overall safety of the operation. The Operator must ensure that all these variables are taken into consideration in dealings with the Drilling Contractor and the Regulatory Agencies during the planning phase of an offshore program to ensure that safety is not compromised.

This complexity is manifested when considering the complicated regulatory regime that has been developed to maintain the standards and rules governing offshore operations.

The study team found that there has been a significant degree of improvement in the safety of offshore operations and in the administration of the overall regulatory control regime during 1982 and 1983. Industry and Government are working together in several key areas where there are common concerns and mutual understanding of weaknesses in the system. Significant steps have been taken by Industry and Government in implementing new ideas, new and improved equipment and systems and in the development of an Industry oriented, training and development program philosophy. Industry and Government have reached a reasonable level of understanding of each other's roles and objectives.

It is the opinion of the study team that the most significant development during the period has been the marked improvement in safety awareness on the part of Industry employees, supervisory staff and senior management.

The Regulatory Agencies have matured significantly during the time and the local administration of Government policies in the operating areas has been a positive step in improving communication between Industry and Government. There has also been a definite relaxation of some of the politically oriented, local employment, goods and services issues that had begun to undermine the working relationships between Government and Industry early in the study period.

The team has however, identified a number of areas of concern in the overall management of the safety regime. These are generally related to marine oriented or non drilling issues and in most cases are related to activities that are under the control of the Drilling Contractors. The majority of these concerns can be traced to what appears to the study team to be a weakness in the overall regulatory control system. The Drilling Contractor, who owns and operates the offshore equipment and who employs the majority of offshore workers, is effectively isolated from the Regulatory Regime that controls these basic components of the Industry.

The concerns in most cases relate to a lack of understanding of the Contractor's business on the part of the Operators and the prime Regulatory Agencies. The Operators and the Regulatory Agencies are forced by the structure of the Control Regime to make decisions of a regulatory nature on detailed issues affecting the Drilling Contractor's equipment, procedures and personnel. These decisions are sometimes carried out without formal effective input from the Contractor and in many cases without the input of those secondary Regulatory Agencies who may have a knowledge and understanding of the specific issues.

Those detailed concerns, which the study team feels are critical to the success of Industry in its management of the safety regime, are addressed in the study. They could be reduced, if not eliminated, by action on the following key recommendations.

1. The roles and responsibilities of the primary and secondary Regulatory Agencies must be clearly defined and any overlapping responsibilities eliminated.

2. Industry must develop strong, dynamic and operationally oriented Industry Associations to deal with Government on issues common to all members.

3. Marine lifesaving equipment must be upgraded through the advancement of lifesaving technology to the level of the technology of the MODU's themselves.

4. There should be a direct, working level connection established between the aviation control agencies and the offshore Control Regime to ensure that the safety of offshore helicopter operations is being effectively monitored.

5. The operation of supply vessels alongside MODU's should be evaluated to determine reasons for a number of incidents involving collision of the supply vessels with the MODU's.

6. The Regulatory Regime must develop a system to ensure that all MODU's are administered in a consistent manner regardless of the flag of registry.

7. The Operators and Government Agencies should put publicity and politically oriented pressures aside when dealing with the development and administration of safety oriented issues. The controversy around random versus scheduled emergency drills must be evaluated in isolation from these pressures. The Drilling Contractors should be given the responsibility to develop an acceptable system that meets the true safety requirements.

The guidelines covering planned evacuation from MODU's in the case of pending bad weather should also be evaluated by the Drilling Contractors in conjunction with the Operators and Government to ensure that all aspects of this approach are considered again in the light of true safety requirements and isolation from external political pressures.

8. The Operators must re-evaluate the utilization of supply vessels in the role of standby support to ensure the standby role is not compromised during the transfer of a vessel from one operating mode to the other.

9. Drilling Contractors should review practices covering safety meetings and drills to ensure there is an effective employee feedback process through which offshore workers can express concerns and receive satisfactory answers to their questions on matters of safety.

10. Operators and Government Agencies must develop a better understanding of the Drilling Contractor's activities and safety control philosophies in order to more effectively develop regulatory controls governing these issues. They should strive for the development of an effective process that will ensure input to the system from the Contractors and the secondary Regulatory Agencies specializing in contractor related issues.

11. Industry and Government must continue the development of an overall training and development program based on the Drilling Contractor's training requirements, that is consistent with accredited international programs and allows the Contractors to use the vast training resources available within their world wide organizations.

12. Although the study indicated a significant degree of comfort with the Well Control Regulations and the

Industry's ability to manage this area the study team feels that it is necessary to raise a warning flag. The overall Well Control process and the success of Industry in this critical management control area of offshore operations are vested in a group of individuals whose ability to prevent serious well control events depends on their total dedication to the wellbore pressure detection process. The best equipment and procedures available, coupled with the best training programs will be to no avail if these key individuals are not committed to maintaining constant vigilance and total awareness.

13. Operators and Government Agencies must develop a strong understanding of the Drilling Contractor's organizational command hierarchy and the differences between the marine oriented and drilling oriented approaches. They should then allow the Contractors to demonstrate their individual capabilities in managing their activities in a safe and efficient fashion irrespective of a particular command philosophy.

Industry is in general agreement that there should be one individual on board a vessel who is in ultimate control at any given time. That individual must obviously be competent in his management and leadership capabilities and he must have a strong knowledge and understanding of both the drilling and marine aspects of the operations with accredited certification in both areas.

Operators and Government Agencies with little knowledge of the management of Contractor's personnel and operating systems should not interfere with the basic safety control philosophies of the Contractors. These systems have been developed over many years of experience and have demonstrated a good safety record.

Industry and Government should set aside differences surrounding the two management styles and work together to develop a consistent approach to the command hierarchy. The objective being the establishment of rules and regulations that would ensure strong basic safety requirements and yet allow the flexibility for Contractors with differing management philosophies to operate according to their best judgement.

APPENDICIES

A. TERMS OF REFERENCE

B. LETTERS OF REQUEST TO INDUSTRY

1.0 INTRODUCTION

The purpose of this study is to assess critically the methods used and the degree to which Operators and Drilling Contractors regulate the safety of eastern Canadian offshore drilling operations. The terms of reference defining the overall scope of the review are included in Appendix A.

The study includes an outline of the drilling activities carried out on the Canadian east coast during 1982 and 1983, showing the active Operators and Contractors, the geographic areas in which they operated and the types of equipment utilized.

Emphasis was directed toward an objective evaluation of the ability of the offshore drilling industry to conduct its operations in a safe manner within the framework of the regulatory regime imposed by Governmental Agencies. Areas of specific interest included well control, lifesaving equipment and procedures, marine emergency training and marine procedures. The organizational structures of the Operators and Drilling Contractors were reviewed along with the various interrelations between Industry and Government. The methods used by the Industry in the administration of its offshore activities were also studied.

The information utilized in the study was obtained through a formal request to those Operators and Drilling Contractors who were active off the east coast of Canada during 1982 and 1983. Copies of the request letters are included in Appendix B.

The response from Industry was varied with seven of fifteen companies responding in written form. Five of these replies were from Operators and two were from Drilling Contractors. Twelve of the companies agreed to informal interviews. These were evenly distributed with six Operators and six Drilling Contractors participating in the interview process.

Written and verbal responses were both of a general nature, concentrating on the prime areas of concern within the overall regulatory control process. Most Industry participants were frank and open in their written and verbal responses, but asked that the study team maintain the confidentiality of their comments. The study team undertook a commitment that any controversial issues identifying specific companies be reviewed with those companies prior to submission of this report.

The response to the request for information was affected to some extent by the number of similar studies that have been undertaken by the Royal Commission, by various Government Agencies and by Industry itself during the past year. It is the opinion of the study team that most companies had a desire to support the request for information, but most were restricted by operational activity levels and an already high level of input to other reports and task force studies. The team has, therefore, drawn on outside sources of information and on its own experience in the Industry in order to reach a more complete analysis of the overall safety regime.

2.0 OFFSHORE OPERATING ENVIRONMENT

In order to provide an objective assessment of the ability of the Industry to operate safely, the study team felt it necessary to define the Industry's activity base and the environment in which Industry operates. The following synopsis provides an outline of the Canadian offshore Industry, its activity, and its operating and business environment.

2.1 INDUSTRY ACTIVITY 1982 - 1983

The offshore drilling activity level during 1982 and 1983 is outlined in Figure 2 - 1. This summary shows all wells drilled in eastern Canada during the period, identifying the Operator, the Drilling Contractor, the rig type, and the operating area. This data base is also shown graphically in Figure 2 - 2 and Figure 2 - 3, according to Operator and Contractor activity respectively. A number of observations result from a review of this data.

i) A significant amount of the exploration activity in the study period took place on the Labrador Shelf and in Davis Strait on seasonal programs utilizing dynamically positioned drill ships.

ii) There were a large number of wells drilled using jack-up drilling equipment off Nova Scotia.

iii) There were a number of changes in the Operator/Contractor combinations during 1983. This was the result of several new Operators making farm-in arrangements that included the use of existing rigs contracted to the original Operators.

FIGURE: 2 - 1

DRILLING ACTIVITY SUMMARY 1982 - 1983

OPERATOR	WELL NAME	AREA	UNIT	SPUD DATE	RIG RELEASE	FINAL TOTAL DEPTH M.	WELL STATUS
Canterra Energy Ltd.	Raleigh	N18	Petrel	Aug. 1, 1982	Oct. 3, 1982	3958	Susp.
Canterra Energy Ltd.	S. Hopedale	L39	Petrel	July 13, 1983	Aug. 17, 1983	2364	Abd.
Home Oil Company Ltd.	Louisburg	J47	Labrador	Nov. 25, 1983	OPERATING		
Husky/Bow Valley East Coast Project	Glooscap	C63	Bow Drill 2	Aug. 7, 1983	OPERATING		
Husky/Bow Valley East Coast Project	Trave	E38	John Shaw	Nov. 12, 1983	OPERATING		
Irving Oil Co. Ltd.,]	Cablehead	E95	High Island 9	June 23, 1983	Sept. 7, 1983	3235	Abd.
Chevron Standard Ltd.	Cp. Spencer	#1	High Island 9	Sept. 14, 1983	Nov. 9, 1983	2598	Abd.
Irving Oil Co. Ltd.,]	Bluenose 2	G47	John Shaw	Dec. 30, 1982	Sept. 5, 1983	5797	Abd.
Chevron Standard Ltd.]	Nautilus	C92	Sedco 706	Sept. 29, 1981	July 16, 1982	5116	Susp.
Mobil Oil Canada Ltd.	Linnet	E63	Sedco 706	July 18, 1982	Nov. 14, 1982	4520	Abd.
Mobil Oil Canada Ltd.	N. Dana	I43	Sedco 706	Dec. 13, 1982	OPERATING		
Mobil Oil Canada Ltd.	Hibernia	I46	W. Venture	Dec. 18, 1982	Aug. 5, 1983	3436	Abd.
Mobil Oil Canada Ltd.	Hibernia	K14	W. Venture	Aug. 9, 1983	OPERATING		
Mobil Oil Canada Ltd.	Flyingfoam	L23	Ugland	Nov. 11, 1981	May 5, 1982	4554	Abd.
Mobil Oil Canada Ltd.	Bonanza	M71	Ugland	May 14, 1982	Jan. 27, 1983	5295	Abd.
Mobil Oil Canada Ltd.	Rankin	M36	Ugland	April 2, 1983	Aug. 7, 1983	3967	Abd.
Mobil Oil Canada Ltd.	Hibernia	B27	Ugland	Aug. 8, 1983	Dec. 17, 1983	4380	-

OPERATOR	WELL NAME	AREA	UNIT	SPUD DATE		RIG RELEASE		FINAL TOTAL DEPTH M	WELL STATUS
Mobil Oil Canada Ltd.	Venture	B43	Juneau	June	7, 1981	April	25, 1982	5872	Abd.
Mobil Oil Canada Ltd.	S. Venture	B59	Juneau	April	29, 1982	Jan.	2, 1983	6176	Susp.
Mobil Oil Canada Ltd.	Venture	B52	Juneau	Jan.	19, 1983	Oct.	27, 1983	5791	Abd.
Mobil Oil Canada Ltd.	Olympia	A12	Scotian	April	23, 1983	Jan.	6, 1983	6064	Susp.
Mobil Oil Canada Ltd.	Arcadia	J16	Scotian	Jan.	27, 1983	July	18, 1983	6005	Susp.
Mobil Oil Canada Ltd.	Venture	H22	Scotian	July	26, 1983	OPERATING			
Petro-Canada									
Resources Inc.	Corte Real	P85	Neddrill 2	July	12, 1982	Oct.	14, 1982	770-3946	Susp.
				July	13, 1983	Oct.	9, 1983	3946-4395	Susp.
Petro-Canada									
Resources Inc.	Rut	H11	Pacnorse 1	July	24, 1982	Oct.	12, 1982	3527-4093	Susp.
				Aug.	4, 1983	Sept.	13, 1983	4093-4474	Susp.
Petro-Canada									
Resources Inc.	Pothurst	P19	Pelerin	July	12, 1982	Oct.	22, 1982	3943	Susp.
				July	24, 1983	Sept.	22, 1983	3843-3992	Abd.
Petro-Canada									
Resources Inc.	Pining	E16	Pelerin	June	27, 1983	July	4, 1983	555	Susp.
Petro-Canada									
Resources Inc.	Banquereau	C21	Bow Drill I	Dec.	2, 1981	Aug.	1, 1982	4991	Abd.
Petro-Canada									
Resources Inc.	N. Banquereau	I13	Bow Drill I	Aug.	2, 1982	Dec.	26, 1982	5188	Abd.
Petro-Canada	S.W.								
Resources Inc.	Banquereau	F34	Bow Drill I	Feb.	19, 1983	Aug.	30, 1983	6309	Abd.
Petro-Canada									
Resources Inc.	St. Paul	P91	Bow Drill I	Sept.	2, 1983	OPERATING			
Petro-Canada									
Resources Inc.	Terra Nova	K08	Sedco 710	Aug.	2, 1983	OPERATING			

FIGURE: 2 - 1

DRILLING ACTIVITY SUMMARY 1982 - 1983 (CONTINUED)

OPERATOR	WELL NAME	AREA	UNIT	SPUD DATE	RIG RELEASE	FINAL TOTAL DEPTH M	WELL STATUS
Petro-Canada							
Resources Inc.	W. Esperanto	NSS	Vinland	Aug. 16, 1982	May 4, 1983	5703	Susp.
Shell Canada							
Resources Ltd.	Shubenacadie	NSS	Sedco 709	Nov. 5, 1983	Feb. 9, 1983	4200	Abd.
Shell Canada							
Resources Ltd.	Glenelg	NSS	Sedco 709	Feb. 22, 1983	Nov. 9, 1983	5148	Abd.
Shell Canada							
Resources Ltd.	Alma	NSS	Sedco 709	Dec. 3, 1983	OPERATING		
Shell Canada							
Resources Ltd.	Uniake	NSS	Vinland	May 9, 1983	OPERATING		

* DS - DAVIS STRAIT GB - GRAND BANKS CB - CAPE BRETON
 LS - LABRADOR SHELF PEI - PRINCE EDWARD ISLAND
 NSS - NOVA SCOTIA SHELF NB - NEW BRUNSWICK

FIGURE: 2 - 2

ACTIVITY BY OPERATOR

<u>OPERATOR</u>		<u>DRILLING UNIT</u>	
Canterra Energy Ltd.	Petrel	DPDS*	
Home Oil Company Ltd.	Labrador	JU	
Husky/Bow Valley	Bow Drill 2	SS	
East Coast Project	John Shaw	SS	
Irving Oil Co. Ltd.,	High Island 9	JU	
Chevron Standard Ltd.	John Shaw	SS	
Mobil Oil Canada Ltd.	Sedco 706	SS	
	West Venture	SS	
	Ugland	SS	
	Juneau	JU	
	Scotian	JU	
Petro-Canada	Neddrill 2	DPDS	
Resources Inc.	Pacnorse 1	DPDS	
	Pelerin	DPDS	
	Bow Drill 1	SS	
	Sedco 710	DPSS	
	Vinland	SS	
Shell Canada			
Resources Ltd.	Sedco 709	DPSS	
	Vinland	SS	

* DPDS - Dynamically Positioned Drillship
 DPSS - Dynamically Positioned Semisubmersible
 SS - Moored Semisubmersible
 JU - Jack-up Drilling Unit

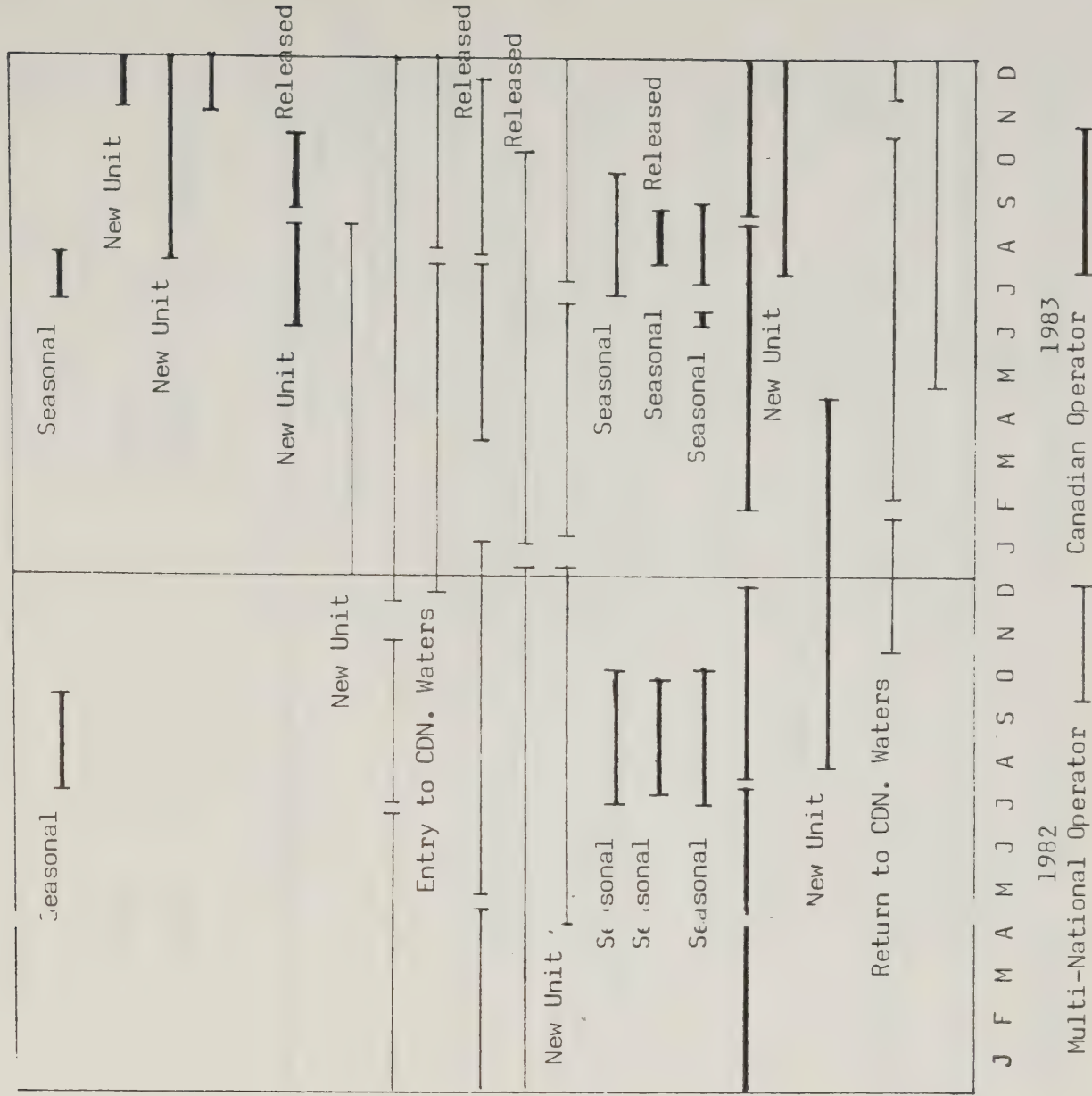
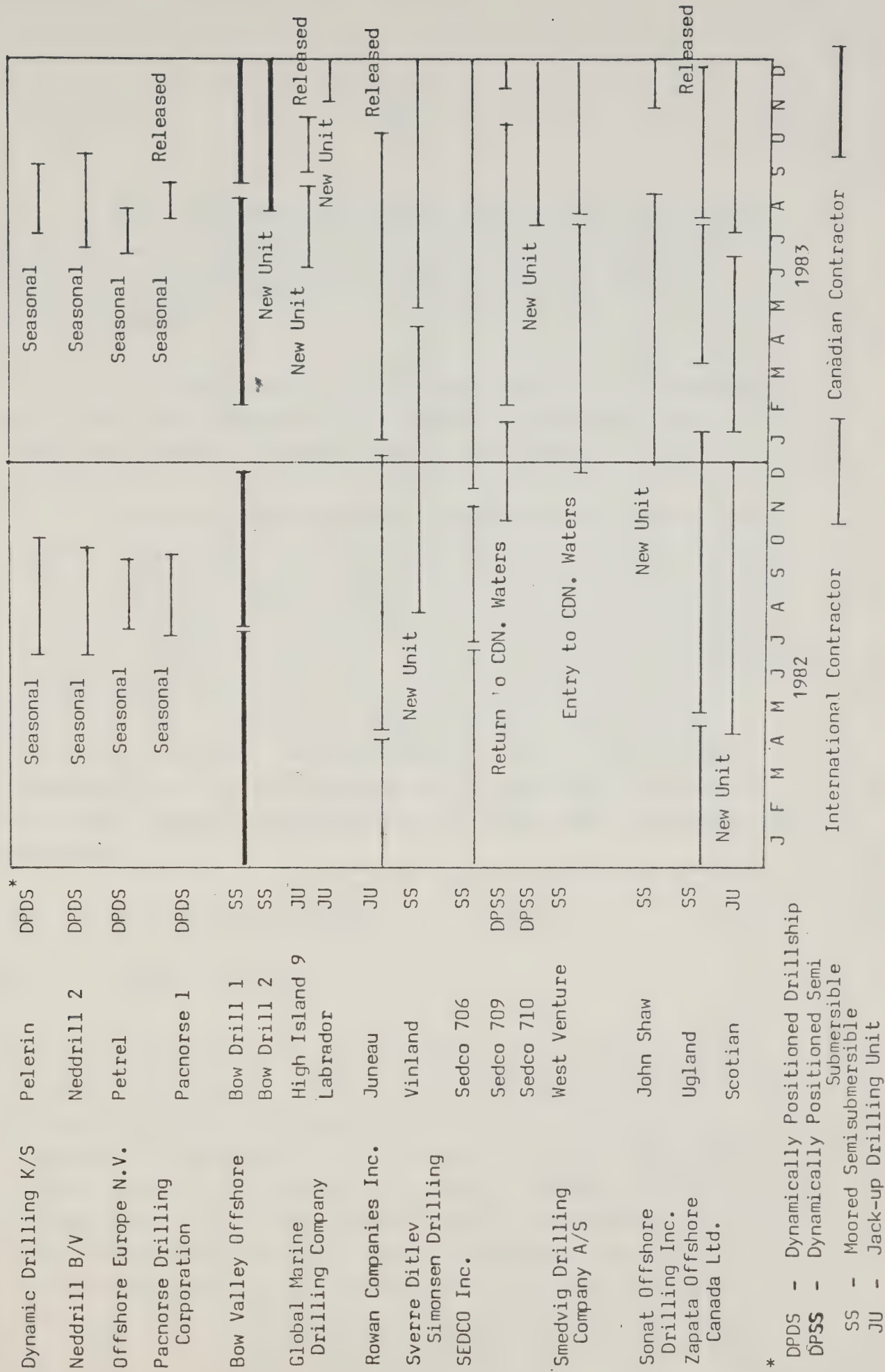


FIGURE: 2 - 3

ACTIVITY BY CONTRACTOR

DRILLING UNIT



* DPDS - Dynamically Positioned Drillship
 DPSS - Dynamically Positioned Semi Submersible
 SS - Moored Semi Submersible
 JU - Jack-up Drilling Unit

iv) There was a definite shift in activity level from the major Operators to the new Canadian Operators as a result of the Canadianization emphasis of the National Energy Program.

v) There was a significant turnover in equipment with five rigs completing assignments in Canadian waters and nine rigs commencing operations in the area.

Activity levels were variable over the period with program terminations and with new Operators and Contractors joining the east coast offshore industry. This transfer of equipment between Operators and the continually changing list of active drilling units is one of the key elements to consider when evaluating the Industry and its performance. This continual movement of equipment does not provide sufficient time for the formation of the strong working relationships that an Operator and a Contractor develop as they gain a better understanding of each other's methods and policies.

2.2 PHYSICAL ENVIRONMENT

2.2.1 Weather and Ice

Drilling operations offshore eastern Canada are constrained by weather and/or ice conditions in a number of different areas. The Labrador coast and Davis Strait programs, for example, are confined to a relatively short, two and one half to three month summer season. Sea ice further constrains these operations at the beginning of the season and severe autumn storms cause suspension of operations at the end of the season. Iceberg activity throughout the season further reduces effective operating time. The surveillance and management of iceberg movement

constitutes a major component of the activity on these operations. Ice and weather conditions and the resulting short duration of the season essentially dictate the utilization of dynamically positioned drilling units in this area. This is due to their ability to systematically move from the path of the ice and to quickly re-establish connection with the sea floor wellhead assembly when the hazard is removed. Even with this capability there is a significant amount of pressure on the operating personnel to maximize the use of the available operating time.

Icebergs and sea ice must also be monitored on the Grand Banks where conventionally moored semi submersibles are utilized for their motion characteristics. The northern part of the Grand Banks is susceptible to sea ice encroachment in mid winter, as evidenced during the winter of 1982/1983 when a significant amount of down time was experienced. Sea ice can also dictate the timing of offshore operations in the Gulf of St. Lawrence.

Semi submersible drilling units are designed for operations in rough seas, but when operating in water depths under 100 meters during the winter their effectiveness is reduced by the constraints of the mooring systems. Jack-up drilling units are also restricted in their operating water depth range in areas where weather conditions are severe. The offshore acreage lying in the area between the minimum winter operating depth for world class semi submersibles and the maximum winter operating depth for conventional jack-ups is significant in terms of the total available exploration acreage off Nova Scotia. A new generation of large, heavy weather jack-ups has the potential to cover this significant portion of the Canadian frontier and one of these units joined the list of active drilling units in late 1983.

2.2.2 Water Depth

The wide range of water depths off the east coast of Canada also dictates the type of drilling equipment required. A large portion of the Canada Lands acreage lies in water depths from 100 to 300 meters. Exploration programs, in this water depth range, are within the operating capability of world class, conventionally moored, semi submersible drilling units. There is a significant amount of acreage in the depth range of 50 meters to 100 meters that is beyond the capability of the larger conventional jack-up units and yet too shallow for the year round semi submersibles as indicated in Section 2.2.1 above. This area requires special attention not only in use of the new generation of heavy weather jack-ups but also for the alternative use of semi submersibles with special mooring configurations during the summer drilling season when weather conditions are less severe.

There is a significant amount of acreage in water depths less than 50 meters that is only accessible with conventional jack-up drilling units.

Canada's deep water acreage requires the use of dynamically positioned drillships or dynamically positioned semi submersibles. It is of interest to note that almost one half of the worldwide fleet of dynamically positioned drilling equipment is either currently working for, or under long term contract to, Canadian Operators.

2.2.3 Supply Network

Exploratory drilling operations in eastern Canadian waters have, in all probability, the greatest variation of

supply and logistics network requirements when compared with other areas in the world. Operations in Labrador and the Davis Strait have marine supply routes in excess of 1600 km. Routine air support in the area involves as many as four separate fixed wing and helicopter flights per trip. In contrast, activities in the Gulf of St. Lawrence may be carried out within sight of marine and air support bases. The long supply routes have a bearing on not only the type of drilling equipment used, but also on the type and number of support vessels and aircraft required and on the complexity of the safety and communications contingency programs.

The large variations in the physical environment that characterize east coast offshore operations dictate the use of a wide range of equipment and operating procedures, and tend to increase the requirements for extensive and specifically tailored safety contingency plans. The Industry operates in one of the world's most complex and hostile environments and as a result must place a high degree of emphasis on safety.

2.3 OPERATOR'S BUSINESS ENVIRONMENT

2.3.1 Operator's Objectives

Operating companies are motivated by the basic objective to establish producible hydrocarbon reserves which ultimately will provide an acceptable rate of return to company shareholders. Traditionally the internationally based major operating companies have used their vast resources to achieve this objective in world wide exploration theatres. These companies have been in the forefront of frontier exploration offshore eastern Canada

for many years. Because of their size and financial resources, they were the only Operators capable of competing in the very costly, high risk, frontier exploration business.

Canadian companies traditionally limited their activities to domestic programs in western Canada or to minor, non operating, participation in the high risk frontier and international plays. The exploration incentive programs, brought forward in the past several years in an effort to "Canadianize" the industry, have changed the balance in frontier exploration. Over the study period, there has been an obvious shift to Canadian operatorship of east coast exploratory drilling programs. This has been primarily achieved through farm-ins or joint ventures with the international companies as well as through direct awards of exploration permits to these new Canadian Operators.

This shift in emphasis has brought a new type of Operator into the industry. They are of a much smaller size and generally lack offshore operations exposure. Many have been involved with offshore programs in the past, but were seldom in an operating role where they could develop hands on expertise.

The Canadian offshore industry is now in a situation where over one half of the Operators are found in this category. Although most of these companies have acquired staff with significant expertise, from the major operating companies, they have not had sufficient time to develop integrated and comprehensive systems and procedures; nor have they had time to develop the team work approach necessary to operate as effectively as their more mature international competitors.

These new, inexperienced players have a tendency to concentrate on issues that are most critical to their specific area of interest. When these groups deal with Regulatory Agencies, who may also be keenly interested in the local issues, there is a tendency to adopt equipment, systems, and basic philosophies that may not be compatible with operations in other countries or even in other Canadian operating theatres. This tendency to adopt special regional arrangements, although totally acceptable in the particular operation, could create or promote situations or attitudes not totally compatible with accepted industry safety practices.

2.3.2 Equipment and Personnel Resources

The local affiliate of a major international resource company may, to a large extent, be directed by the parent company in the use of equipment and personnel. This process can have significant advantages and disadvantages. The equipment and personnel resources from a multinational operations pool will, in most cases, be more economical and will meet overall company policies and procedures because of long term planning and elaborate contractor selection processes. The systems and personnel may not, however, be suited to, or experienced in, the local operating conditions. The management of the local affiliate is therefore placed in a compromising position. The ultimate decision on the use of a particular piece of equipment becomes a matter of matching the minimum requirements for the area to the economics associated with the availability of in house equipment.

2.3.3 Land Position and Partner Participation

The business and exploration planning strategies of the various companies are highly dependent on the status of their exploration commitments to Government, and on the influence of their exploration group partners. Although it is unlikely that these influences would affect the safety of an operation, it is conceivable that an Operator may be put in a position where he is not able to obtain the optimum equipment or personnel for a particular program. There are situations where the Operator is not contributing to the cost of a specific well, albeit maintaining a residual interest in the land. In this case the Operator has only his operating credibility at stake. He, therefore, may not devote the same degree of effort to ensure the project is run as safely and as efficiently as would be the case if that Operator's exploration budget was being directly affected. This is especially true if one of the Operator's totally financed operations is concurrently experiencing difficulties and requires a significant share of available personnel resources.

2.3.4 World Wide Market Trends

The quality and price of offshore drilling equipment and services, available for a program, is highly dependent on the international market. Operators who are forced to mobilize equipment in a tight drilling market, when drilling rigs are in short supply, are often obliged to accept equipment of a standard somewhat under their base requirements in order to meet exploration agreement timing commitments. In order to avoid this problem Operators are forced to negotiate long term contracts in order to secure equipment more tailored to their general needs.

2.3.5 Canadian Content

The "Canadianization" efforts of the National Energy Program has created a situation similar to the tight market situation outlined above. Canadian content pressures imposed on Operators in their quest for exploration agreement approval, may force them to accept Canadian equipment and personnel packages that are of a standard less than what may have been available in the international market.

These internal and external pressures have a tendency to complicate the Operator's environment and his ability to control the overall safety of the operation. The Operator must ensure that all these variables are taken into consideration in dealings with the Drilling Contractor and the Regulatory Agencies during the planning phase of an offshore program to ensure that safety is not compromised.

2.4 DRILLING CONTRACTOR'S BUSINESS ENVIRONMENT

2.4.1 Drilling Contractor's Objectives

The offshore Drilling Contractor's prime objective is to maximize the return on an investment in drilling equipment and in technical and administrative support networks. Major international Drilling Contractors work in an industry prone to cyclic activity levels which correspond to the variable exploratory and development spending trends of the resource industry. Many Drilling Contractors, exposed to these cyclic conditions will demand the highest rates competitively obtainable in peak activity periods, recognizing that a weak market lies somewhere in the future. Other Contractors will strive to negotiate longer term contracts, at possibly less than obtainable short term rates, to cushion the effect of the cyclic trend.

Once a drilling contract is in place, whether short or long term, the Contractor has alternate approaches to the maximization of returns. Some Contractors believe the best method to maximize profits is through the use of well designed, well managed and well maintained equipment run by well trained, conscientious employees. On the other hand there are Contractors who, by meeting only minimum contractual obligations and regulatory commitments, keep their operating costs to a minimum and in this way maximize their return. There is a subtle difference in these two philosophies, both of which have the same basic objective. The latter approach has a marked effect on the morale of personnel working on the drilling unit and their resultant performance can detrimentally affect the overall safety of the operation.

2.4.2 Drilling Contract Duration

The length of a contract can have a material effect on the Contractor's basic operating philosophy. For example, a Contractor would be more amenable to upgrading equipment and to developing and training personnel with the assurance of a long-term contract. This is especially true in the case of the employment and development of local employees. It is usually in the Contractor's best interests to recruit and develop local personnel if the drilling unit is contracted to work in an area for an extended period. This reduces personnel recruiting, development and travel costs and contributes to the bottom line economics. The Contractor with a seasonal or even a one year contract is hesitant to use local manpower because of the short term recruiting and training costs and the inherent operating inefficiencies.

2.4.3 Equipment Type

The types of drilling equipment in use in east coast, Canadian waters cover the full range from medium depth jack-ups through conventionally moored semi submersibles to dynamically positioned semi submersibles and drill ships. Each category of equipment has distinctly different operating characteristics and requirements. It is difficult to develop a universal suite of safety procedures and systems that can be applied across this wide range of equipment.

2.4.4 Operator's Experience Level

The Operators working on Canada's east coast vary in their offshore experience levels and their local/regional operations knowledge. The Drilling Contractor, who is new to the area, working for an Operator who is inexperienced in the area, is at a disadvantage in his ability to relate, in a short time frame, to the local conditions and regulations. This Operator/Contractor combination, where both parties are at the same level on the learning curve gives rise to concern on the part of the experienced Operators and Contractors in the area.

2.4.5 Onboard Command Hierarchy

The organizational structure defining the onboard command hierarchy varies from Contractor to Contractor. The two basic philosophies are the marine oriented, primarily European, system and the drilling oriented, primarily Gulf of Mexico, system. These basic operating philosophies have been developed over a number of years of successful operation and are difficult, and in most cases, impractical

to mix or alter. Both systems are being utilized in Canadian waters along with variations of each. These systems are described in detail in Section 3.2.4.

2.4.6 Employee Development

The individual Contractor's basic approach to training and development varies considerably. Some Contractors have extensive inhouse development programs, in support of large international multi-rig operations, while other Contractors have less comprehensive programs that utilize outside schools and are designed to meet their specific requirements. In general terms, Contractors whose operating philosophy includes a strong preventative maintenance ethic also accentuate the importance of well trained personnel. Contractors whose overall maintenance philosophy is reactive tend to provide training programs that meet minimum requirements.

Drilling Contractors working in the international market, have need for consistent personnel development and training procedures which are applicable to all operations, transcending regulatory and national boundaries. Legislated training programs in host countries that duplicate, or conflict with, these internal programs cause significant disruption in the Contractor's personnel development process and their resultant ability to operate in a safe manner.

These are some of the more basic environmental, equipment and business elements that typify the Canadian offshore industry. This complexity is manifested when considering the complicated regulatory regime that has been developed to maintain the standards and rules governing offshore operations.

2.5 GOVERNMENT REGULATORY ENVIRONMENT

This section presents an overview of the development of the primary regulatory agencies governing petroleum exploration off Canada's east coast since 1981.

2.5.1 The Canada Oil and Gas Lands Administration (COGLA)

The principal purpose for the creation of COGLA was to concentrate, within a single body, the oil and gas management functions previously exercised by the Department of Indian Affairs and Northern Development (DIAND), with respect to Canada lands situated north of a line of administrative convenience, and by the Department of Energy, Mines and Resources (EMR), with respect to Canada lands located south of that line. COGLA was formed in 1981, in preparation for the passage of the Canada Oil and Gas Act, which provided a restructured legal framework designed to govern oil and gas activity in the Canada lands according to the precepts of the National Energy Program (NEP). COGLA was intended to be the principal point of contact between government and the oil and gas industry concerning their activities in the Canada lands.

During the two year study period considered here, COGLA has developed from a small organization of former DIAND and EMR staff members to a large regulatory agency with myriad responsibilities. Under the direction of the Ministers of DIAND and EMR, COGLA negotiates exploration agreements, authorizes all activities respecting the exploration for and production of oil and gas on Canada lands, issues Drilling Program Approvals, inspects exploration and production operations and coordinates the development of related Canada Benefits plans and the resolution of environmental concerns.

COGLA has an unusual organizational status. It is not a program or a branch within a particular departmental framework, nor does it have the independence of a Crown Corporation. It cannot be compared to most existing federal units of organization. It is an administrative body with dual functional responsibility to Northern Policy (DIAND) and Energy Policy (EMR).

Under the Memorandum of Understanding between EMR and DIAND that established COGLA, both departments turned over to COGLA their respective oil and gas resource management functions for Canada lands. Each department, however, retained a substantial number of policy and operational activities with which COGLA activities must be coordinated. COGLA is headed by an Administrator, who has authority to make all ongoing operational decisions and bears the principal responsibility for the implementation of the Canada Oil and Gas Act and is also, under the Oil and Gas Production and Conservation Act, the Chief Conservation Officer. Policy advice is provided by the COGLA Policy Review Committee (PRC), which includes senior personnel from both EMR and DIAND. The PRC ensures that COGLA policy decisions are consistent with the requirements of Energy Policy and Northern Policy.

Two of the six main branches of COGLA have primary responsibility for offshore safety:

1. The Engineering and Control Branch is responsible for the regulation and monitoring of exploratory drilling on Canada lands. The Branch is responsible for the administration and enforcement of the Oil and Gas Production and Conservation Act and of regulations promulgated

thereunder as well as for ensuring that an Operator takes all the precautions necessary for the safety of personnel, the prevention of pollution and the conservation of resources.

2. The Environmental Protection Branch has primary responsibility for the evaluation and approval of contingency plans covering both environmental and personnel safety in the event of apprehended or actual disasters.

2.5.2 COGLA Regional Offices

In addition to the central operation, COGLA maintains two regional offices in the study area, with responsibilities for the (1) Nova Scotia and (2) Newfoundland and Labrador Sectors. Each office is headed by a Director General. The Nova Scotia office has existed longer and is larger and more developed than the Newfoundland office. Certain functional positions are shared between the regions.

The function of the regional offices in the regulation of safety offshore is to represent COGLA responsibilities and requirements on a regional level. In particular, the regional office is responsible for interpretation of COGLA's safety requirements to regional Operators, for liaison with representatives of industry and provincial governments on safety issues, and the monitoring and inspection of offshore operations for compliance with COGLA safety regulations. The regional office is also responsible for granting the "Authority to Drill a Well".

The role of site specific and regional monitoring

and inspection of operations is perhaps the most important function of the regional offices. In this regard, they exercise discretion on most issues on a regional level, with provision for appeal to Ottawa headquarters if needed.

Since COGLA is mandated to carry out all administrative responsibilities for regulation and management of the offshore petroleum resource under the terms of the Canada-Nova Scotia Offshore Agreement, the COGLA Nova Scotia office is responsible to the joint Canada-Nova Scotia Oil and Gas Board which administers this agreement, as well as to the COGLA Ottawa headquarters.

2.5.3 Canadian Coast Guard (CCG)

The Canadian Coast Guard (CCG) is the principal federal agency outside COGLA with direct responsibility for the safety of offshore exploratory drilling operations. CCG's responsibilities lie in the control and approval of design and construction of drilling units and support vessels and their related safety systems, as well as the operations, equipping and marine staffing of such vessels. The authority to regulate these matters derives from the Canada Shipping Act, in the case of Canadian flag rigs and vessels and from COGLA in the case of foreign registered drilling units and their support craft operating under COGLA license. A Memorandum of Understanding, setting out the terms and conditions for cooperation between the CCG and COGLA with respect to the provision of marine services to the offshore areas of petroleum development, was signed on July 22, 1982.

CCG maintains two regional operations within the study area; these are the Maritimes and Newfoundland

Regions. Mirroring the Central organization, each regional office has a group of regional managers responsible for a staff of surveyors and inspectors whose job it is to ensure compliance with CCG requirements for all vessels within their jurisdiction.

2.5.4 Federal Legislation

One of the principal legislative elements of the NEP is the Canada Oil and Gas Act, passed as Bill C-48 and proclaimed on March 5, 1982. The Act sets out the requirements for the granting of oil and gas exploration and production rights, establishes the fiscal regime applicable to oil and gas activities in the Canada lands and includes transitional provisions for moving from the old to the new regime.

In addition to the Canada Oil and Gas Act, Bill C-48 included amendments to the Oil and Gas Production and Conservation Act, which provides the framework for detailed technical and safety requirements for work and activity in the Canada lands. This Act authorizes the Minister to issue operating licences and specific authorizations for oil or gas activity in the Canada lands. The Minister must also, prior to issuing any authorization, require the submission of a satisfactory Canada Benefits plan that may include affirmative action programs.

The Oil and Gas Production and Conservation Act and the Canada Oil and Gas Act form the main legislative basis of the regulatory regime administered by COGLA. The former regulations, which remain in force to the extent that they are consistent with the new regime, are being replaced by a

comprehensive set of new regulations, now in the process of being prepared by COGLA. Of primary importance among these is the Canada Oil and Gas Drilling Regulations. These regulations set out the requirements for obtaining a Drilling Program Approval, an Authority to Drill a Well and for the actual drilling of a well on Canada lands. They also regulate well evaluation and termination, the inspection of drilling operations and equipment, environmental requirements and the investigation of accidents at drill sites.

The Canada Shipping Act and its attendant regulations constitute the basis for the entire administration of marine transportation in Canada. The legislation sets down standards for the design, construction, operation and maintenance of Canadian flag vessels, their machinery and equipment, navigation, handling and stowage of cargo, and qualification, training and certification of personnel. By extension, the Canada Shipping Act also applies to vessels operating out of Canadian ports. At present the Act does not apply to foreign flag drilling units operating outside the 12 mile limit, so that CCG's involvement in regulation of these units is by authority of COGLA. Recent proposed changes to this legislation have direct relevance to offshore drilling activities especially mobile offshore drilling units (MODU's).

2.5.5 The Newfoundland and Labrador Petroleum Directorate (NLPD)

The Newfoundland and Labrador Petroleum Directorate is the provincial government organization responsible for

the overall management of the Province's oil and gas resources and for the development of legislation pertaining to the technical and policy issues surrounding petroleum exploration, development and production. Under the direction of the responsible Minister, NLPD negotiates exploration agreements, authorizes all exploration and production activities and inspects operations associated with these activities. Although several departments and agencies within and outside the provincial government are involved in the provincial regulatory regime, the NLPD is responsible for overall coordination of the activities of other provincial departments as they relate to offshore petroleum activity.

NLPD is headed by an Executive Director, who has authority for ongoing operational decisions as provided for under existing regulations. The NLPD began as a section of the Department of Mines and Energy, but became an agency in its own right in 1981. During the study period it has grown in size, particularly with respect to numbers of inspection staff. A policy and planning group within NLPD is responsible for social and economic assessment, public information and business co-ordination. Responsibility for safety-related issues lies with the Resource Management section. Within the Resource Management section one group of personnel is responsible for the administration and enforcement of regulations covering the safety of offshore operations. The managerial and technical personnel responsible for operations safety form the "Operations Control" group of the Petroleum Directorate.

2.5.6 Newfoundland and Labrador Legislation

The major pieces of provincial legislation which

govern safety in offshore operations in Newfoundland are the Petroleum and Natural Gas Act, administered by the Petroleum Directorate, and the Occupational Health and Safety Act, administered by the Newfoundland Department of Labour and Manpower. Three sets of regulations set out government policy on safety:

1. The Newfoundland and Labrador Petroleum Regulations, 1977 outline in broad terms the safety requirements to acquire an exploratory permit and production lease. The nature of inspections and operations control is also set out in general terms. Additionally, these Regulations outline provisions whereby the Minister can intervene directly in the Operator's operations and prescribe whatever measures are necessary, including ordering a permanent or temporary halt to operations, where there is a threat to the safety of personnel.

2. The Newfoundland and Labrador Petroleum Drilling Regulations, 1982 are organized into two main parts:

Part I of the regulations prescribes several conditions and obligations for a drilling operation including: procedures for approval of a drilling program and for the submission of a contingency plan; requirements for monitoring and inspection of drilling operations; and conditions for the granting of authority to drill, test or terminate a well.

Part II of the Regulations deals directly with safety equipment and procedures. It includes requirements for lifesaving and firefighting equipment and for the treatment of hazardous materials. Standards are indicated for

electrical installations, boilers, radioactive substances, elevating devices and explosives. General requirements are established for standby vessels, support vessels, medical facilities and diving operations.

3. The Offshore Installations (Design, Construction and Survey Regulations and Guidelines), 1982 govern the certification of offshore installations, including offshore drilling units. They establish practices to be observed in the siting, alteration and equipping of offshore installations. Standards are prescribed for the appointment of Certifying Authorities; for conducting surveys; and for the issue of a Certificate of Fitness.

3.0 INDUSTRY SAFETY PROCEDURES

3.1 OPERATOR'S PROCEDURES

The results of the information gathering process and the analysis of data from this and other Industry sources are summarized in the following functional categories. Common issues are listed, as are anomalies in the ways various Operators and Contractors control their activities.

3.1.1 Well Control Systems and Procedures

The well control systems and procedures utilized by the Industry are in general terms equivalent to, and in most cases more comprehensive than, those specified in the regulations. Well control and blowout prevention have always been high priority items with both Contractors and Operators and they have devoted significant technical and operational resources to the subject. Regulatory groups world wide have worked closely with the more progressive Operators and Industry Associations for guidance and input in the formulation of well control guidelines.

There are a number of differences in the various Operator's well control procedures and as a result the equipment and systems utilized may vary from Operator to Operator and Contractor to Contractor. Regulations, therefore, have tended to take on the form of strong directional guidelines that allow enough flexibility to accommodate these technical and philosophical differences while still providing strong basic standards and controls.

The study indicated that all Operators were in agreement with the Canadian regulations and that they were able to work in harmony with the various agencies in the

administration of their programs. Most Operators believe that their internal policies and those of their Contractors exceed the basic requirements of the regulations.

All Operators indicated that their onboard representatives have certification in the PITS Well Control Schools, or in accredited international schools and that these representatives take an active role in onboard well control training exercises, well control drills and equipment testing and inspection procedures.

Operators provide third party contract logging and sampling services, to constantly monitor the drilling fluid returns and key drilling parameters to detect changes in the pressure profile during drilling and also to monitor the volume of drilling fluid returns, all as a first line preventative well control measure.

Well control drills and exercises are given high priority and are conducted on a frequent basis on new programs until all crew members are competent in their roles. Thereafter drills are conducted on a regular basis, at least weekly. It was not evident from the study whether or not Government inspectors played an active role in the well control training procedures on board the vessels.

Most Operators utilizing semi submersibles and the large heavy weather jack-ups have installed 105 MPa well control equipment to enable the drilling of deep, high pressure prospects. This equipment has been developed over the past three to four years primarily for Canadian offshore programs and as a result the Canadian industry is at the leading edge of technology in the development of this specialized equipment.

Regulatory Agencies have been involved with Industry in this technical evolution and as a result have maintained a good working relationship with Industry. The development of new equipment tends to highlight weaknesses or deficiencies in the ancilliary or peripheral systems which in turn leads to an upgrading of the entire well control system. The use of the high pressure BOP systems has, in this fashion created a greater awareness of high pressure welding requirements, the upgrading of casing design, well head and marine riser component design, and innovations in the equipment utilized to handle the complex BOP packages.

The Petroleum Industry Training Service has developed an offshore well control school, tailored to a specific drilling unit and its systems, that is conducted onboard the vessel while it is operating. This approach has been adopted by several of the Operators and is gaining acceptance in Industry. The approach also allows Government inspectors the opportunity to become knowledgeable in the specific systems they are directed to monitor. The approach also allows rig marine personnel, not directly involved with well control, to participate and become more familiar with drilling systems.

The study team in discussions with Industry personnel identified a number of issues that require further attention in the area of well control.

i) Hydrogen Sulfide

Hydrogen sulfide has not been encountered in drilling operations in eastern Canadian waters to date. There may therefore be a degree of complacency in Industry with respect to this potential hazard. All drilling units are equipped with hydrogen sulfide monitoring devices and the basic

hazards of hydrogen sulfide are addressed in well control training courses. The review process pointed out that some of the Operators have conducted onboard hydrogen sulfide training, but it does not appear that this training is universal.

ii) High Pressure Materials and Fabrication Techniques

The use of high pressure BOP systems, well control manifolds, well testing systems and associated piping, amplifies the need for highly sophisticated materials and equipment fabrication techniques, inspection procedures and materials and equipment test documentation. Rigid procedures should be put in place for fabrication and welding of high pressure components and all employees must be made aware of the dangers associated with the control of high pressure fluids.

The complex, high pressure systems that are now considered standard in Canadian operations require well trained competent personnel. It is absolutely essential that Operators who are not experienced in the use of this type of equipment, ensure that their own employees and especially their supervisory consultants are well trained in the use of these systems.

iii) Deep Water

The technology for deep water well control systems should be reviewed and highlighted in those areas of departure from the normal systems and procedures used in the more conventional water depths. Casing design, BOP function reaction times, and kick control procedures are examples of areas that require adjustment when deep water drilling is contemplated.

iv) Relief Well Capability

The area of relief well philosophy and planning should be reviewed in the light of current drilling equipment availability, well design parameters and the unique environmental conditions now being encountered. Ice and weather constraints are recognized in the basic contingency planning exercises especially in the areas where seasonal programs are conducted. There is a large area where water depths in the order of 50 to 100 meters restrict the use of drilling systems to heavy weather jack-ups. This area may require further evaluation to define back up requirements since there is a limited number of these units in the world market place.

3.1.2 Lifesaving Equipment and Procedures

The lifesaving equipment and procedures utilized by Industry comply with regulations and with special directives that have been issued from time to time. Industry has adopted the latest innovations in lifeboats, life-rafts, immersion suits, highspeed rescue boats and multiple-person rescue baskets, irrespective of the status of formal regulations. This has been done in response to the requests of the Regulatory agencies and as a result of Industry initiatives. This is an area where Industry and Government have been effective in a joint effort to improve safety offshore.

The general philosophy among the Operators is that the drilling rig, because of its design parameters, is the safest place to be in a rough weather situation. This philosophy assumes that the rig and its associated equipment are maintained and operated in such a way as to ensure the rigs integrity and therefore its safety. Since it is not possible to completely eliminate risk the

next priority must be to provide the best lifesaving equipment available and ensure that all personnel are trained in, and feel comfortable with, the use of that equipment.

XIII All Operators are of the opinion that the principal weakness in the overall lifesaving process lies with the lifesaving vessel launching systems. Industry does not have, nor is there an immediate likelihood for the development of, an effective system to transfer personnel from a drilling unit safely into the water in rough sea conditions.

Industry has, therefore, adopted an approach that firstly concentrates on maintaining the integrity of the drilling unit to minimize the need to evacuate, and secondly, to provide state of the art lifesaving systems and training for personnel to ensure the maximum capability of recovering personnel from the sea should abandonment be unavoidable.

All Operators have developed extensive contingency plans and operating procedures that outline each particular safety procedure. Their programs are developed in close liaison with the Drilling Contractors, their own operations personnel, and their respective safety representatives. These procedures form a part of the overall operations package submitted to and reviewed by Government in application for Drilling Program Approval. Safety procedures and lifesaving equipment are also reviewed and inspected in the process of regular vessel certification by the classification agencies. General Industry consensus is that this system of cross checking coupled with an overall better awareness of safety should identify any weakness in the lifesaving process.

The Canadian Operators in conjunction with the prime Government Agencies have made significant efforts in the past two years to provide the best lifesaving equipment and systems available to enhance the safety of personnel employed in offshore drilling activities. There are, however, a number of areas where Industry believes further attention is required.

i) Safety Training

The area of lifesaving training, not only for rig crews, but also for support vessel and helicopter crews, must continue to have a high priority and must be specifically tailored to the Industry's needs and to the unique Canadian operating environment. Programs should be developed cooperatively between Industry, Government and the training agencies.

ii) Safety Management

The attitude of senior management with respect to safety must be sincere and visible to ensure that all employees are committed to running a safe program and that they have the assurance that their management is fully supportive. The Industry is not consistent in its position on safety and risk management and there appears to be a need to evaluate these particular areas of expertise to determine if there are any potential techniques available to improve the overall awareness in safety management.

iii) Evacuation Systems

There is a significant amount of research and development work required to develop more effective evacuation systems. The Industry should immediately take a lead role in this work since the marine safety industry has

not demonstrated a true understanding of the drilling industry or its specific requirements. It appears that the resource industry has delegated its responsibility to the marine industry assuming it was best qualified to develop equipment and systems. The development of evacuation systems has not kept pace with that of drilling vessel design or well control system design. It, therefore, seems logical that the offshore drilling industry should take the lead role in the development of more effective evacuation systems.

iv) Safety Audit

Several Operators utilize, either in conjunction with or independent of their Contractors, a safety audit approach which provides a realistic, arm's length check on the effectiveness of their Contractor's and their own internal safety programs. Some Operators feel this process can be more effective if greater emphasis is placed on safety specialization and manning within the operating company's organization both at the operating level and at the head office or senior management level.

v) Site Specific Training

The Industry has not reached consensus on a standard philosophy toward safety training. Some Operators advocate standard procedures and systems that allow personnel to move from one operating theatre to the next, without requiring special local training courses. Other Operators favour a rig specific, location specific, approach to ensure total familiarity with the equipment and procedures that will actually be utilized. There are advantages and disadvantages in both systems and there is a need to take this issue into consideration in the development of all basic safety training programs. One

Operator, because of the remoteness of its operation and the great distances from the marine base facilities, has developed procedures and systems that are tailored to their specific project. This Operator expressed the concern that a regulatory process designed to fit the majority of offshore operations may be too inflexible to allow companies operating in unique situations to develop site specific programs.

vi) Prototype Systems

Several experienced Operators expressed concern that the new Canadian Operators may hastily adopt unproven equipment and procedures, to meet perceived regulatory needs in order to improve their acceptability in the eyes of the Regulatory Agencies when exploration agreements are being reviewed and when drilling authorities are requested. Experienced Operators feel that such an approach could create unforeseen hazards and would lead to inefficiencies and unnecessary costs for the Industry. This amplified the need for emphasis on Industry coordinated research and development programs that could evaluate and test equipment before it is accepted by, or regulated into, the system.

vii) Rescue Capability

Some Operators pointed out that a prime area of weakness in the current lifesaving systems was the ability to safely transfer personnel from lifeboats and liferafts to rescue vessels. One Operator's contingency plans called for a two-stage rescue approach. The first priority would be to get people out of the water and into liferafts or lifeboats. Once the personnel are out of the water, and the danger of hypothermia is significantly reduced, the urgency for recovery is also reduced. The transfer of the personnel to a

supply boat or the rig itself, can then be delayed until weather conditions allow the transfer to be done in relative safety. Most other approaches have been directed at immediate recovery by the prime rescue vessel.

viii) Search and Rescue

Most Operators agreed that the current search and rescue system is limited in its effectiveness by resources and by the vast areas in which the Industry operates. The controversy around repositioning of equipment and personnel in St. John's, Newfoundland appears to be more politically motivated than "user need" oriented. Several Operators indicated that they were confident that SAR would reposition equipment and personnel on an emergency basis if requested by an Operator. SAR's ability to respond in this fashion would be, of course, dependent upon weather conditions at the time, availability of equipment, as well as other calls for assistance. The key issue appears to be one of communication with SAR as early as possible in a potential emergency situation. SAR can more effectively respond to needs if they are brought into the picture early enough to plan their response in a dynamic fashion having full knowledge of all aspects of the particular operation. The development of a search and rescue component within industry and the coordination of a combined Government/Industry SAR System have a high priority position with most Operators.

ix) Immersion Suits

The use of immersion suits on helicopters was discussed at length in light of the EPOA Safety Task Force recommendations. Some individuals felt there was significant merit in developing a system whereby only one suit would be utilized offshore. This suit would be worn on board the

helicopter and would also be utilized as the prime survival suit on the rig. Several individuals felt that this process would ensure total familiarity with one suit and that its use would become an automatic reaction.

The downside to this approach relates to the difficulties associated with escape from a downed helicopter while wearing the more bulky, long term survival suits. The Operators supporting the single suit system feel that there is a much greater risk of helicopter accidents than drilling unit accidents, and therefore, Industry should concentrate its efforts on developing a solution to the problem of exit from a helicopter, while wearing the large suits.

3.1.3 Marine Emergency Training

The operating companies' main emphasis on marine emergency training in the past was primarily directed toward ensuring that their Contractors met the regulatory requirements specified in the drilling program approval process. Significant pressures during the study period, both internal and external, with respect to marine emergency training have forced the Operators to take a position of greater involvement. The reaction has been generally positive in that Operators and Contractors have been working with Government toward the solution of a common problem.

One area of concern that surfaces in discussions with Industry, centers around the Operator's involvement in the Contractor's procedures and policies. External pressures for visible accomplishments on the part of Industry, with respect to training and drills, have tended to force the Operators and Regulatory Groups to make

decisions on policies and procedures in areas where they do not necessarily have the expertise. This has been done in isolation from the Drilling Contractors whose people make up the majority of those being trained.

The procedures being recommended for use in emergency drills and exercises are an example of the concern. All Contractors, and most Operators favour holding training drills on a scheduled routine basis. Some operators support the idea of random drills currently being advocated by some Regulatory Groups and by some Industry spokesmen. The Drilling Contractor, who has an in depth knowledge and understanding of rig personnel and their motivation, or lack thereof, would appear to be better equipped to develop an effective system of emergency drills. The fact that the Contractors do not have a strong voice in the discussions on this critical issue is an obvious concern.

One Operator, because of his unique area of activity and because of the seasonal nature of his program, has taken a strong position in the traditional Contractor's role. The company works closely with its Drilling Contractor in a very positive fashion. The Operator in this case is the only common denominator, in that his Drilling Contractor works in Canadian waters for only a short time each year and in fact may not return the following season. Therefore, the Operator feels that it is essential to share his local expertise in the development of acceptable marine emergency procedures for the specific area.

All Operators agreed that there is a requirement for a coordinated, consistent approach to marine emergency

training. The Operators all expressed concerns that the courses and facilities that were originally advocated by the Regulatory Agencies were not tailored to the offshore industry. The Operators felt that the courses were not well coordinated, and that the training agencies were inefficient in terms of enrollment and processing. All Operators indicated they have now taken a positive interest in working with the Contractor's Association, the Regulatory Agencies and a central training coordinating agency to develop systems tailored specifically to Industry needs.

Most Operators felt that significant progress has been made over the past year, but that considerable work remains. They also indicated a need for the Regulatory Agencies to put aside regional prejudices and work together to assist Industry in this critical area.

Some Operators feel their key responsibility in the area of marine emergency training is to work with the Drilling Contractors and the Regulatory Agencies to develop a sound training philosophy that meets Industry's needs and that will allow for variations in the environment, equipment types and basic operating policies of the various Drilling Contractors.

3.1.4 Marine Procedures

i) General

The development and administration of marine procedures has traditionally been the responsibility of the Drilling Contractors and the support vessel contractors. Operators have a wide variance in their understanding of, and commitment to, the truly marine aspects of offshore

operations. This was evident from the Operators comments on their levels of inhouse marine expertise. Some Operators have marine specialists on staff in both operating and safety roles while others leave marine specialization to their Contractors or to parent companies based outside Canada. As a result the Operator's contribution to the development of marine procedures and policies is limited. These Operators, therefore, rely to a large extent, on their Contractors for development of procedures. The key concern identified here is that an Operator, with minimal marine expertise, dealing with a non-marine Regulatory Agency, have between them, the capability of developing and instituting policies and procedures that may be unworkable for the Contractors and that may be potentially hazardous. It is, therefore, essential that Operators work more closely with their Contractors on marine related issues and that they seriously consider the development of inhouse marine expertise.

ii) Marine Administration Policy

The operation and control of MODU's in most countries is directed by a single Regulatory Agency. Canada is unique in that the administration of MODU's is handled by several different agencies depending on such issues as the distance from shore, the political map, the type of rig and the country of registry. Canada does not have a consistent marine administration policy covering waters on the continental shelf, and there is no clear definition of which agency has responsibility for control of specific elements of marine safety. Canada has only recently taken an active interest in offshore safety control and since the current regulatory framework has only been in existence for slightly over two years, it is not surprising to find a significant

degree of confusion. All Operators expressed concern with the lack of consistency in policy. They are frustrated in their efforts to define the rules under which they are expected to operate.

Although the inspection, certification and safety of marine equipment and systems is of prime importance to the Operators, it is nevertheless, the responsibility of the vessel owners to comply with regulations. The Operators however, because of the basic framework of the regulatory control regime, are expected to work directly with the Regulatory Agencies on marine oriented issues where they may not have hands on expertise. This is in direct contrast to well control issues where Operating Companies have the background and expertise to work with Government Agencies on the development of well control regulations.

The Operating Companies feel that it is essential for them to maintain control over all activities since they are ultimately responsible to Government for operations carried out on Canada lands. The Drilling Contractors on the other hand are frustrated in their efforts to achieve a meaningful dialogue with the Canadian Coast Guard, on marine matters, because the control system does not allow formal contact between them.

iii) Support Vessel Operations

The operation of supply vessels in support of offshore drilling programs gives rise to safety concerns in two areas. One is respect to potential collisions with drilling units and the other is related to the vessel's role in marine emergency situations.

Support vessels are normally under contract to the Operator, and as a result, the Operator is seen as the responsible party in the eyes of the Regulatory Bodies. Support vessel crews, in their day-to-day activities, communicate directly with the Drilling Contractor's marine personnel on board the drilling units. All operational issues that arise between supply vessel contractor and Drilling Contractor are, therefore, in relative isolation from the Operator. The regulatory system, on the other hand, promotes situations where the Operators deal directly with the Regulatory Agencies in the development of controls for the operation of supply vessels, in isolation from the supply vessel owners, and the Drilling Contractor's marine personnel.

A number of the Operators are now developing inhouse expertise in marine operations. This will provide the capability to coordinate the needs and concerns of the Operator, the Drilling Contractor and the supply vessel operators. It will also enhance the Operator's ability to deal with the Regulatory Agencies in the formulation of workable rules and regulations.

Since the Operator's specific concerns with supply vessel operations are shared by the Drilling Contractors and since the issues are more directly related to the Drilling Contractor's activities, they are discussed in detail in section 3.2.4, ii.

iv) Onboard Command Hierarchy

The command relationships onboard MODU's vary with the operating philosophy of the particular Drilling Contractor as previously stated.

The Operator's primary concern in the area of vessel command is in relation to their Contractor's ability to satisfy local regulatory requirements. Operators are evenly divided in their preference for who should be in ultimate command, the marine specialist or the drilling specialist. All Operators were, however, in agreement that there should be one individual in command and that that individual must not only have competence and experience in his own area of specialization, but that he must have a strong understanding of the roles and activities of the other department. The two department heads must work as a team and they must include the Operator's representative in their team oriented decision making process. All Operators were in agreement that competence, training and experience and understanding of the complete drilling unit operation were more important factors than whether an individual from the drilling or the marine discipline was assigned ultimate control.

Operators also felt strongly that traditional habits were important. In other words a Contractor who had a proven track record utilizing a drilling oriented control system should not be forced to adopt an alien marine oriented control system. An imposed command arrangement, initiated in the interests of political acceptability without a thorough technical and operational analysis, will not necessarily improve safety, and could in fact result in serious consequences. The Contractor's concerns on the issue of command hierarchy are discussed in detail in Section 3.2 dealing with the Drilling Contractor's Operations.

v) Planned Evacuation

The philosophy governing the planned evacuation of

drilling units in the event of impending bad weather has been given a great deal of emphasis over the study period. Industry and Government reached agreement on a workable approach in late 1983.

The guidelines for evacuation are related to forecasted wind speeds in excess of some assigned value, which can be expressed either in terms of actual wind speed or as a percentage of rig design capability. It is the general feeling that the decision was taken somewhat arbitrarily to primarily satisfy a political need without a great deal of technical or operational input. Operators have accepted the approach with some apprehension due to the manner in which it has been implemented and to the lack of consistency in the approach.

The key issues that come into play are the accuracy and timing of the forecasting services, the ability to evacuate a large number of people in a safe manner prior to the deterioration of weather conditions, and the need to maintain an "essential" crew component on board the drilling unit.

An even more basic element of the evacuation question is that of rig design capability and its relation to the local environmental conditions. The semi submersibles in use off the east coast are designed for the sea state conditions encountered in the operating area. These designs have a number of built in safety factors which allow for some inaccuracy in Industry's ability to define the maximum sea state conditions that may be expected. The general feeling in Industry is that the rig is the safest place to be during severe weather conditions and that

evacuation need only be considered when the rig has been damaged through a collision or is in danger from ice movement, blowout, fire, etc.

The prime concern on the part of Industry and the Regulatory Agencies stems from the recognition that the life saving equipment currently available is inadequate in safely evacuating personnel from the drilling unit in rough seas. This suggests that personnel should be removed from the drilling unit before conditions deteriorate to the point where evacuation becomes hazardous.

Difficulties arise when the accuracy and timing of weather forecasting are considered. Weather forecasting on the Canadian east coast is reasonably accurate. However, the tracking of major storm activity and the dynamics of the changes in intensity and direction of major storms are not well defined. This inaccuracy coupled with the long flight times and the variable weather conditions at the air support bases leave a number of questions. The Operators therefore have little confidence that the planned evacuation system can be counted on for a systematic safe evacuation.

The design, operation and in many cases the flag requirement of MODU's, require that an essential crew complement be on board at all times, save of course, catastrophic occurrences. The design of a semi submersible and to a lesser extent that of a drill ship is such that there is a need for a continuous or dynamic management of basic systems. Mooring lines require constant monitoring and adjustment of tension to ensure uniform stress levels. Ballasting systems require constant monitoring and movement of ballast to correct for wind, wave and current loads as

well as the constantly changing mooring loads. Essential support systems such as heat, power and communications must also be maintained. This dictates the need for a minimum crew complement varying from a minimum of 12 personnel to as high as 20 depending on the vessel. These personnel require support in the form of basic needs such as food, mechanical and electrical service and backup relief. The key question as identified by the Operators relates to the number of essential people and to the positions that are considered essential. In any case Industry and the Government Agencies are in basic agreement that it is necessary to keep a viable complement of personnel on board.

Industry is not in total agreement on the merits of evacuating "non-essential" personnel. Concerns are raised, and they appear well founded, that planned evacuation may put personnel in a potentially more dangerous situation in the transfer to the helicopters or the support vessels. Operators feel that the ultimate decision to evacuate requires a very comprehensive dialogue with all personnel who are directly involved, including the helicopter pilots, the workboat captains, the crane operators on the rig, the weather forecasters and SAR, to ensure that any actions taken are in the pure interests of safety.

Although Industry is obviously prepared to work within the evacuation guidelines, the individual Operators were very adamant in that they ensure that all relevant factors are weighed very carefully, and all the people directly affected are consulted before any evacuation action is taken.

3.2 DRILLING CONTRACTOR'S PROCEDURES

3.2.1 Well Control Systems and Procedures

The Drilling Contractors are in general agreement with the regulations governing BOP equipment and allied systems. Most Contractors indicated that their company policies, combined with those of the Operators for whom they work, result in equipment specifications and operating and testing procedures more comprehensive than those called for in the regulations. Well control drills, personnel training and certification all meet or exceed specified rules.

The Contractors vary somewhat in their approach to well control training. However, all have either an extensive inhouse well control training program or they make effective use of a number of accredited international well control schools, combined with internal development programs.

The Contractors work more closely with their Operators on well control safety than in any other area. Well control has traditionally been the area of greatest concern in terms of personnel safety, rig safety, economic viability and credibility with the public. Operators and Contractors alike have developed significant inhouse expertise in the area. New equipment and new procedures are developed on the drawing boards of the Operators and the Contractors as well as the engineering and design departments of the equipment manufacturers.

The well control equipment on a drilling unit is usually owned by the Contractor, and it is, therefore, the

Contractor's responsibility to maintain that equipment and to ensure that personnel are competent in its use. There are a number of exceptions where the Operator owns the subsea equipment because of that Operator's special needs. In this case there is usually an agreement with the Contractor for management of the equipment. This is a further indication of the dual responsibility for well control on the part of Operators and Contractors.

The Contractors feel that the type of regulations currently in effect in Canada ensure that strong basic requirements are met. They also feel that the regulations allow both the Operator and the Contractor to apply new equipment, and innovative procedures as they are developed and proven, and accommodate basic philosophical or procedural differences peculiar to individual Contractors that would not be possible in a highly regulated regime.

Several Contractors indicated that Industry has a tendency to become complacent in the area of well control and that they must continually upgrade and evaluate their systems and the effectiveness of their training programs to ensure continued awareness of well control standards and safety in general.

The Contractors operating off Canada's east coast have begun to work with the Operators and with the Petroleum Industry Training Service (PITS) to develop well control training programs that are consistent with international programs and that can be utilized to train new personnel as well as to upgrade and familiarize experienced foreign personnel. PITS are currently conducting rig specific well control training programs on board MODU's. Most Contractors

indicated they were considering this approach. Well control training through the PITS organization has been well established in western Canada for a number of years and the transistion to offshore operations has been relatively effective to date.

The fact that the exploratory drilling business is truly international, dictates that all equipment, systems, personnel skills and training should be readily transferable. Well control systems and philosophies that have evolved over the years in Canada were developed with this universal consistency and with full participation between Government and Industry.

It is the opinion of the study team that this long term emphasis on the part of Government and Industry, each having a strong degree of commitment and concern, is the prime reason for the harmony and competence that exists in this particular area of safety.

3.2.2 Lifesaving Equipment and Procedures

i) Equipment

The Drilling Contractors surveyed, all meet the current regulations and directives with respect to life-saving equipment and systems. The Contractors have worked with the respective Operators and with Government to install the latest equipment available. Equipment deliveries and the timing of regular shipyard maintenance visits, have not permitted complete adoption of some of the latest innovations but this overall upgrading is proceeding to the satisfaction of Industry and the Regulatory Agencies.

The major weakness in the area of lifesaving equipment and procedures as identified by the Drilling Contractors is in the area of evacuation from a MODU in rough seas. The current state of the art in lifesaving equipment and procedures is inadequate in relation to the capability of the drilling units themselves. The evolution and development of this equipment has taken place within the marine industry. Evacuation procedures for a conventional ship are different from those used on a semi submersible and, therefore, equipment and systems or even philosophies developed for one may not necessarily be transferable to the other. Individuals from both operating companies and Drilling Contractors have expressed the concern that innovative approaches have not been forthcoming from the marine industry.

The offshore drilling industry has been content to look to the marine industry for advise, for equipment, and for personnel, assuming that the expertise was state of the art and that the marine specialists were capable of adapting their ideas and philosophies to the drilling business. It appears that this may not be the case and that the Operating Companies, the Drilling Contractors and the Regulatory Agencies should adopt a more aggressive approach to satisfying the Industry's particular needs, as was done in the area of well control. This would require the Operating companies and the traditionally drilling oriented Contractors to develop more extensive inhouse marine expertise. Those Contractors who have evolved from companies with long marine backgrounds have somewhat of an advantage, in this area, but here again there appears to have been a certain amount of resistance in bringing the two professional disciplines together.

ii) Safety Audit

Contractors are somewhat inconsistent in their approach to a safety audit system. Some Contractors have adopted a marine safety audit system not unlike a financial audit approach. Safety specialists from a central administrative group in the head office make regular visits to individual drilling units to inspect safety equipment and systems, and assess the effectiveness of training programs and emergency drills. This is done with the cooperation of the Contractor's local operating staff but at arms length from a management or control perspective. The practice ensures that a professional second opinion is available to identify areas of weakness that may not be evident to those involved in the day to day operations.

Other Contractors because of their relatively small size or immaturity have yet to develop formal audit systems although they recognize the merits of the approach and tend to develop closer local internal controls.

All contractors were in agreement on one key issue. They all expressed the view that the rig is the safest place to be in severe weather conditions, and since the technology of evacuation is not as advanced as that of the MODU's themselves, every effort should be made to ensure the basic safety and integrity of the drilling unit. This can only be accomplished through continual systematic inspection and maintenance of equipment and systems and through the use of effective employment and training programs. This preventative maintenance approach will minimize the need to utilize the emergency safety equipment and procedures. The Contractors feel they will have achieved their safety goals if they utilize the best proven equipment and systems

available and if they have trained their personnel to the best of their ability in the use of this equipment and are still able to operate competitively.

3.2.3 Marine Emergency Training

The general consensus among the Drilling Contractors remains that the drilling rig is inherently safe and that their priorities should be to first of all ensure the integrity of the rig and secondly to ensure the competency of the personnel to maintain that integrity. In so doing they minimize the need to adopt emergency measures. Since all Contractors recognize that an element of risk exists and that there will be occasions when emergencies develop, they are in agreement on the need for marine emergency training.

i) Marine Emergency Training Facilities

Industry has traditionally conducted emergency drills on board drilling vessels to a standard set of procedures designed specifically for that particular drilling unit, the crew complement and the area of operation. Procedures were reviewed with, and in some cases modified at, the request of the Operator and submitted as part of the application for drilling approval to the Regulatory Agencies. Recently there has been an emphasis on formalizing this process and in providing a component of safety training for individuals before they actually begin work offshore. This system was put into effect in Norway and to a lesser extent in the UK during the 1970's. Norwegian flag rigs required all personnel to have certified training in marine emergency procedures. When the Norwegian rigs began working in Canada the Contractors and their Operators identified the need for a local training source to

avoid the expense and difficulties associated with sending new Canadian employees to Norway to fulfill this requirement.

Facilities for training seamen in the merchant marine and fishing industries were identified in Newfoundland. The NLPD, recognizing an immediate need for special training requirements in NFLD waters, and Industry's general lack of aggressiveness in developing an industry tailored program, directed Industry to adopt the Marine Emergency Duties program, offered by the College of Fisheries, for all offshore workers.

The NLPD recognized that the College of Fisheries program was not tailored to the offshore drilling industry, but were confident that they could work with Industry and the college to develop an acceptable alternate program in the near term. The development of this Industry tailored school was hampered to a large extent by a lack of communication between Industry and Government. This was primarily due to the initial mandatory approach taken by Government. Industry on the other hand adopted a mood of resistance and lack of cooperation because of its concern over Government involvement. This initial breakdown in communication has been overcome and significant progress has been made, especially in the latter part of 1983, toward the development of an Industry oriented program. Industry's objective has been to build a sound technical program that is receptive to the needs of a highly dynamic Industry and that is universally accepted in other parts of Canada as well as internationally. Although marine emergency training is more "location specific" than other types of training, such as well control or ballast control, it is important to

ensure that any training programs developed be recognized by all the Canadian Regulatory Agencies and that they are compatible with accepted international practices.

Most Drilling Contractors believe that the framework now in place, will enhance the development of a marine emergency training program for the Canadian Industry, but that there is a great deal of work needed on the part of Industry and the training groups to reach an acceptable solution. There is also a responsibility on the part of the Regulatory Agencies to ensure that regional demands on the training agencies or institutions are minimized to ensure that energies are directed toward developing meaningful, consistent and universally accepted programs and in carrying those programs to completion.

ii) Safety Drills and Exercises

As discussed in section 3.1.2, an area of concern currently being addressed by the Contractors is the manner in which lifesaving drills and training exercises are conducted on board the drilling unit. There is a school of thought within Industry, Government and the public domain that drills conducted on a scheduled basis, at the same time every Sunday afternoon for example, lead to complacency on the part of crew members. The initial reaction to this problem has been to advocate a system in which drills are conducted in a random fashion to eliminate this problem.

The Contractors and the majority of the Operators recognize the complacency issue but do not agree that the random approach is the answer to the problem. They are concerned that regulations dictating a random approach to these drills will not reduce the tendency to complacency and

that it can in fact add an element of risk for the personnel.

Contractors feel that emergency drills called at random times have a number of disadvantages. These include such things as disruption of the rest period for the off duty crew and the potential hazards associated with forcing people out of a sound sleep into a full dress lifeboat drill in the dark or in the rain. The prime idea behind a practice drill is to ensure that people are totally familiar with the equipment and procedures they will use in a real emergency. The general feeling among operations oriented personnel is that people will be more receptive and therefore, more apt to learn more about equipment and procedures if practices are held on a regular basis at a specified and convenient time during the day. The Contractors feel the problem of complacency is as significant in the case of random drills as with scheduled drills since people who have put in a particularly tiring shift will have a greater tendency to avoid the exercise. Random drills with some advance notice are acceptable to most people interviewed if done on an infrequent basis with the objective to test the effectiveness of the system under different conditions.

The Contractors feel that the complacency problem is best addressed through management involvement and a more formal approach to participation in the exercises. The Contractors believe that exercises should be carried out, where possible, using a simulated real event to add a degree of realism and interest. Most Contractors agree that individual participation can be made mandatory to the point of significant reprimands for non participation. The

Contractors concur that formal safety meetings, or critique sessions, should be held following each drill with full crew input to discuss overall performance and areas of concern.

This approach not only reduces the tendency to complacency but also ensures a more or less continual dialogue between the Contractor and the employees. The Contractors believe this is much more effective than a random system and that it is not likely to create potentially hazardous situations that are prevalent with the element of surprise.

Most Contractors feel that currently there is a significant safety awareness on the part of the employees and supervisors. They agree however that diligence is required to keep awareness high and to keep people motivated.

iii) Ballast Control Training

Ballast Control training programs have traditionally been developed and carried out by the individual Drilling Contractors since the ballast control systems are unique to each particular drilling unit. A number of the larger Contractors have developed comprehensive in house ballast control programs and associated training facilities. These programs are in many cases made available to competitive Contractors, to their operating clients and to government personnel. The small Contractors, because of close knit organizational structures, with fairly long term on the job training programs and small employee turn over tend to deal with ballast control training as an integral part of their overall training and development programs.

Since semi submersibles had become much more sophisticated and were working in rougher marine environments, it became evident that the area of ballast control required a re-evaluation and upgrading. A recent survey of ballast control systems and their operation carried out on the semi submersibles working off Canada's east coast has demonstrated that the Industry has made a number of equipment and procedural improvements over the past two years. The study also indicated that the level of expertise on the part of those controlling the ballast systems has improved, but that there are still some weaknesses in the systems. Several Contractors have adopted ballast control test exercises that simulate actual events, either normal or emergency oriented, which the ballast control team must isolate and correct. The survey program and the application of these new test exercises have helped and will continue to help define the weakness in the ballast control systems and in the training and awareness of the operating teams.

Some Contractors are ahead of their competitors in the development of systems and training programs. All Contractors, however, feel that ballast control is a key element to the survival of a semi submersible. The number of innovations that have been adopted over the past two years would indicate that all Contractors have a sincere interest in initiating improvements irrespective of their individual level of technical development.

3.2.4 Marine Procedures

i) General

The basic marine procedures which a Contractor uses to conduct operations are outlined in detail in the

operations manual for each drilling unit. These procedures have been developed by the Contractors over time and they are continually being modified and upgraded with experience and as required to meet the specific needs of the Operators, the local conditions and regulatory requirements.

The Contractor's marine procedures form an integral part of the Operator's formal application for drilling approval and, therefore, are reviewed by the Regulatory Agencies. Any irregularities or omissions in these procedures are identified and corrected before an operation is given drilling approval. All Contractors were of the general opinion that their marine procedures were acceptable to the Regulatory Agencies. Several Contractors indicated that they were working with their Operators and their competitors to adapt individual company philosophies into a cooperative operating approach when working in an area with common environmental and operational problems and concerns. The Multi Operator Response plan for the Grand Banks developed in late 1983 is an example of this type of cooperation where Government and Industry can work together to solve global concerns.

This represents a fundamental change in attitude on the part of the Operators and the Drilling Contractors since both have traditionally been very independent and have maintained a strict level of confidentiality on all issues affecting their competitiveness. A large portion of the Canadian offshore frontier has a severe operating environment, the supply/support distances are great and the consequences of mistakes are significant. This recognition of a common set of safety oriented problems has brought the Industry together in a cooperative atmosphere.

ii) Support Vessel Operations

The operation of support vessels in close proximity to the drilling units is an area of concern for a number of the Contractors but because the workboats are contracted to the Operators, the Drilling Contractors have little control over the situation. The incidence of workboats colliding with MODU's has been fairly high in the past several years. Contractors feel that the sophisticated propulsion control systems used on the newer supply vessels are prone to failure, leading to temporary loss of control of the vessel, and as a result allowing the workboat to drift into the drilling units. The workboat crews do not normally utilize a bow anchoring approach when offloading. Although the setting and retrieving of a mooring line is time-consuming, the Contractors feel that the use of such a system would eliminate many of the collisions that occur as a result of loss of control of the propulsion systems.

Some of the Contractors felt that the supply vessel industry should review the basic design philosophy of propulsion systems to ensure that the systems are in fact designed for the service in which they are used. There is a concern that the supply vessel industry has modified the dynamic positioning and maneuvering systems developed for diving and construction support applications as opposed to developing new systems specifically for use in support of MODU's.

Contractors also expressed the concern that the recent "Canadianization" of the supply vessel industry has lead to a reduction in the level of competence in the senior officers on these vessels. The operation of the world class support vessels, now commonly used in Canadian waters,

requires a degree of competence and a level of specialized training not available in the Canadian merchant marine or the fishing industry. They feel that the Industry should evaluate key marine positions with the objective of setting more stringent requirements in terms of training and on the job experience.

iii) Weather and Ice Surveillance

Weather forecasting and ice movement prediction and management is an area where the Contractors have a significant interest, but little control. Both services fall within the realm of responsibility of the Operators. Contractors play only an ancilliary role in making weather observations and in reporting those observations. Most Contractors feel that the weather forecasting services off the east coast are reasonably accurate and suitable for their general needs. The only exception being the problems associated with tracking the major storm centers that move up the U.S. eastern seaboard and pass across the Grand Banks. These storms tend to change pattern, intensity and direction through a geographic area where there is little if any system for weather data measurement.

Contractors have developed a data exchange system to be used during bad weather periods to ensure they have the most up-to-date local information available to plan their activities. This process of sharing real time information is a key part of the multi-operator response plans that are currently under development.

Ice prediction and management programs have become of significant interest to all Contractors operating off Newfoundland within the last two seasons. Previously, only

those Contractors working off the Coast of Labrador were involved in ice management activities. As a result most Contractors are in the learning process with respect to operating in ice prone waters along with their respective Operators.

The relative inexperience of some of the Contractors and Operators who encountered their first sea ice problems during the winter of 1982/1983 gives rise to concern from all sectors. There has been a significant amount of expertise in ice management developed over the years in Labrador and the Davis Strait and Industry and Government are only now making a concentrated effort to ensure that this expertise is shared among all Operators and their Contractors. This concern was amplified in our discussion with Government and some Industry environmentalists. The proprietary nature of many of the environmental studies on weather, sea state and ice conditions prevents the use of this valuable knowledge. The information is gathered at great expense to the individual Operators, who are obviously reluctant to make the data available to competitors free of charge. Industry and Government should investigate the implementation of a system that would place this crucial information in the public domain without penalizing the Operator, who, by the nature or the timing of his program has been forced to acquire the data. This type of information would serve both Industry and the public as it would be of significant benefit in understanding the environment and improving the safety of operations.

iv) Command Hierarchy

There are a number of different approaches toward the basic control organization on board an offshore drilling

unit. The command hierarchy not only differs from one Contractor to another but also between rigs within the same contractor's organization. There are two basic systems in use in Canadian waters, each with a number of variations. The systems are basically differentiated between the marine oriented or European system and the drilling oriented or Gulf of Mexico system. Both have been in use for a number of years by large and small international Drilling Contractors.

There has been a considerable amount of discussion on the relative merits of the two systems over the study period on the part of both Government and Industry. Directives have recently been set out stipulating the use of marine specialists in the senior command positions. This process seriously affects the basic administration and control philosophy of the command hierarchy. Those Contractors whose management systems are based on the drilling oriented system have expressed serious concerns.

The Contractors using the drilling oriented system are quick to point out that they are operating by the new requirements and that they are strongly in favour of any regulations that are required to improve the overall safety of Industry as a whole. They do however question the basic assumptions used in adoption of the marine command philosophy.

The Operators, as mentioned in Section 3.1.4, are divided over the relative merits of the two basic structures. There is one definite thread of consistency throughout the ranks of the Contractors and Operators irrespective of their preference for one system over the

other. All agree that there should be one individual on the vessel in ultimate control at any given time. That individual must obviously be competent in his management capabilities and he must have a strong knowledge and understanding of both the drilling and marine aspects of the operation. This individual must also have a team of competent well trained individuals who have a complete understanding of the particular drilling unit, its systems and the environment in which they are working. The team must be comprised of specialists in drilling, ballast control and marine operations. They must have a positive working relationship based on a teamwork approach.

The decision making process in either emergency situations or normal operations should be based on the input of this team and to a lesser extent on the input of the Operators representative. In situations where personnel safety, equipment safety and/or well safety were involved the management team should have clearly defined procedures outlining the responsibility of the various team members, and the ultimate command reporting relationships. There was general agreement that Industry should set aside the differences surrounding the two management styles and work with Government to develop a consistent approach to the command hierarchy. The objective being the establishment of rules and regulations that would ensure strong basic safety requirements and yet allow the flexibility for Contractors with differing management philosophies to operate according to their best judgement.

The Contractors feel that this issue is another example of the problems created when the Contractor is

isolated from formal communication with the prime Regulatory Agency. They feel that the Operator's understanding of critical elements of their business is not sufficient to represent the Contractors on these issues.

4.0 ADMINISTRATION AND OPERATION OF INDUSTRY SAFETY CONTROL SYSTEMS

4.1 OPERATOR'S ADMINISTRATION OF THE DRILLING PROGRAM

This section deals with the organizational structures existing within the Operator's and Contractor's organizations through which the Operator directs and controls operations and safety related issues.

Outlined in Figure 4 - 1 is a typical organization structure for an Operator covering the headquarters and regional offices and the drilling unit itself. This is in a generalized form, but typical of the established Operators now working offshore eastern Canada.

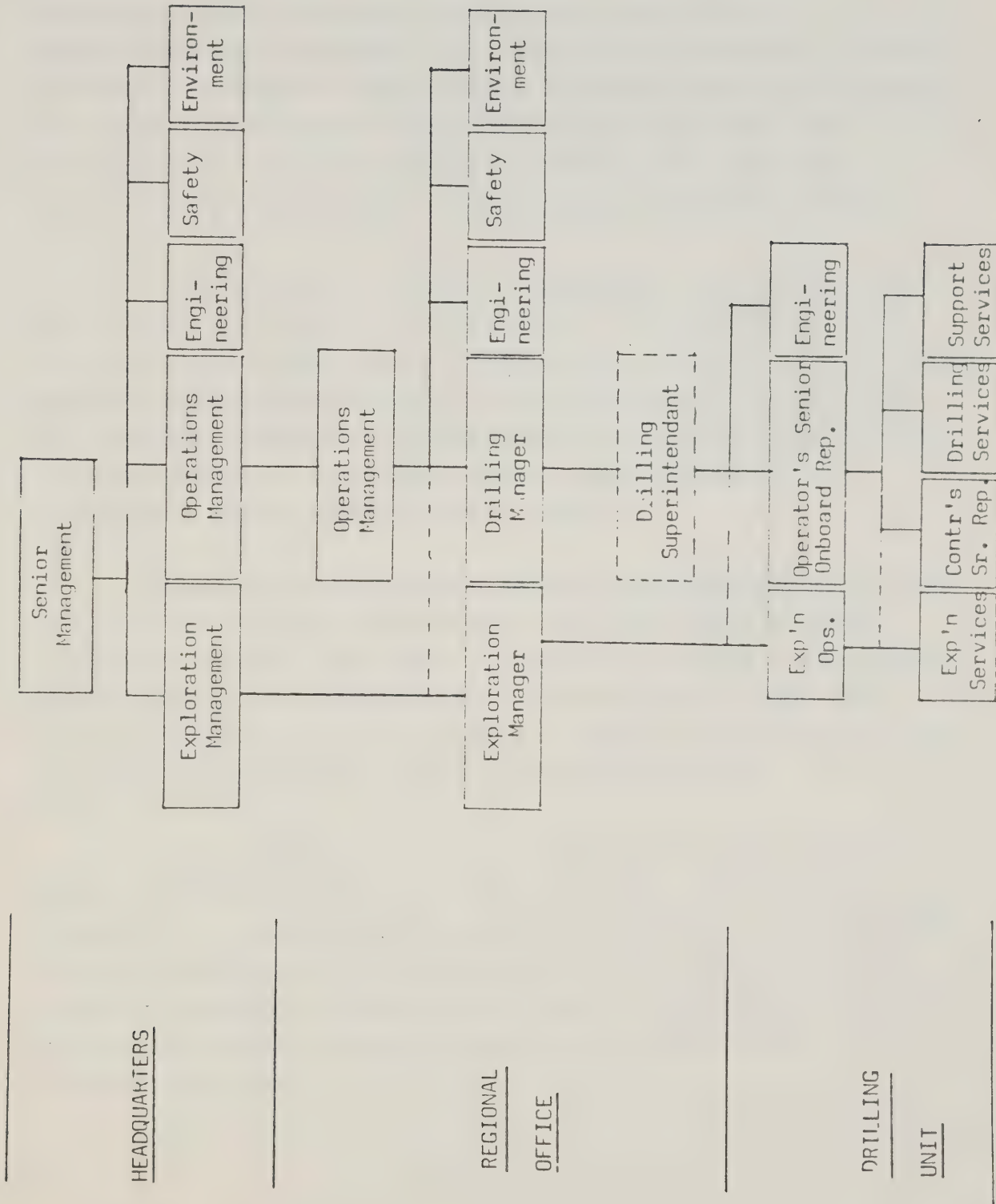
The regional office organization will vary in size, depending on the level of drilling activity under its jurisdiction and on the basic management philosophy of the company with respect to centralized versus regional control.

In context of this organizational review the term "drilling" covers a number of functional areas including drilling, logistics support, administration support, materials management, shore base facilities, and communications. Engineering, safety and environmental functions usually have separate reporting relationships within the overall organizational framework.

The Operator initiates the control process during the contractual arrangement for a drilling system. The Operator defines a contractor selection criteria based on, equipment design, cost, availability, safety record, operating performance, experience on similar projects, organizational philosophy and competence of personnel. Once the Contractor is selected, the Operator ensures the Contractor conforms to the Operator's own internal policies

FIGURE: 4 - 1

OPERATOR'S ORGANIZATION



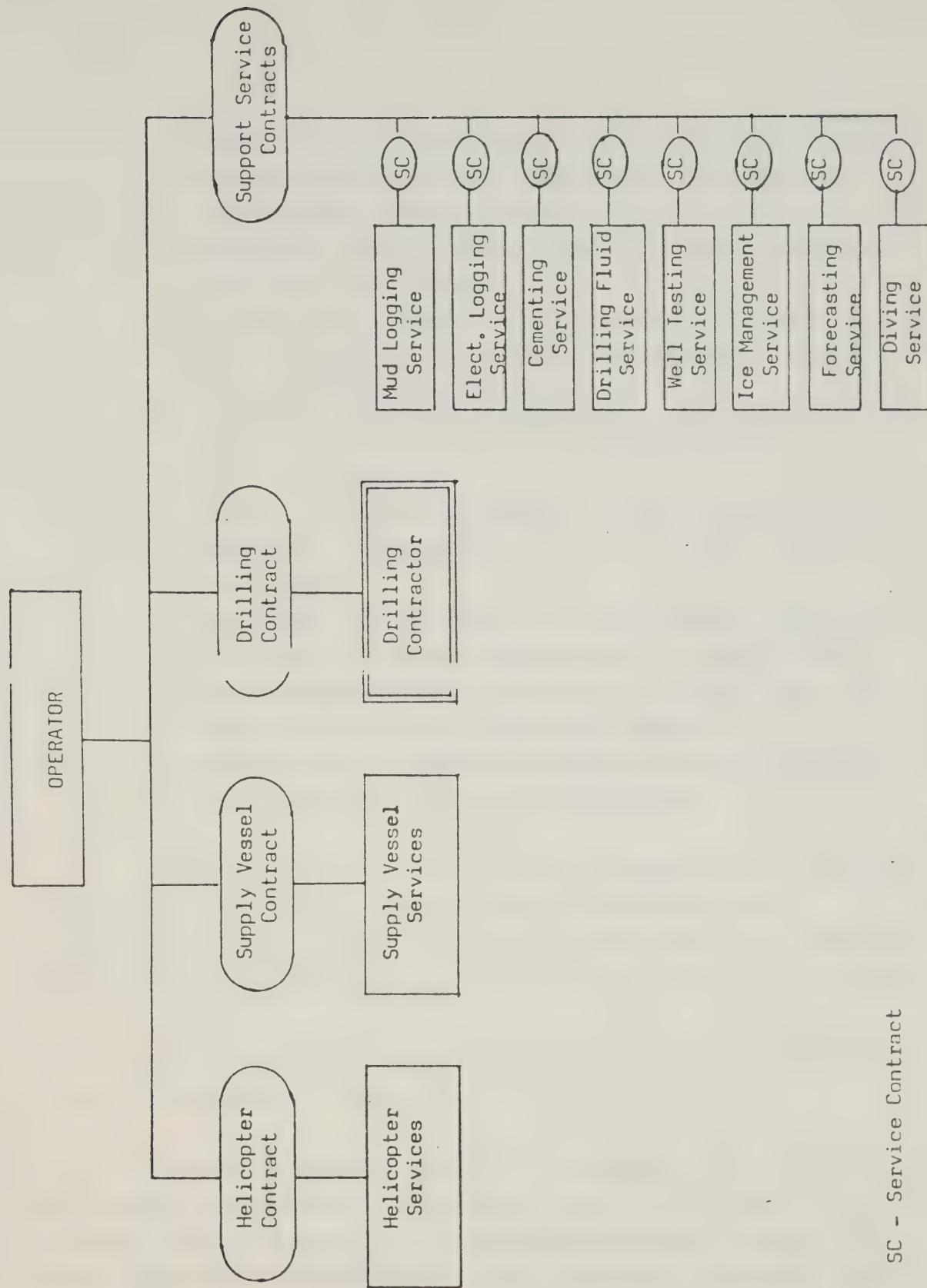
and applicable regulations through specific commitments incorporated in the Drilling Contract and supporting exhibits. This document details the Contractor's responsibility throughout the term of the agreement. These contractual aspects will usually be negotiated at the senior management or headquarters level of both Operator and Contractor. These discussions normally will include operating personnel from the respective regional offices.

The Operator's regional management is charged with the responsibility for ensuring that the Contractor meets the obligations set out in the drilling contract in terms of adherence to Operator policies and Government regulations. The regional management supervises the overall activity and is the Operator's principal contact point with the Contractor during the operating phase.

The Operator's senior onboard representative on the drilling unit is an extension of the Operator's regional office authority. His task is to ensure that the Operator's instructions, in terms of the day-to-day activities and safety issues, are carried out in a manner acceptable to the Operator and in compliance with the regulations.

The Operator's control system during the operating phase is therefore vested in the regional organization. Figure 4 - 2 represents the prime contractual relationships for any particular drilling project. The regional office must be completely familiar with and be prepared to respond to the following issues in order to carry out its responsibilities.

FIGURE: 4 - 2



SC - Service Contract

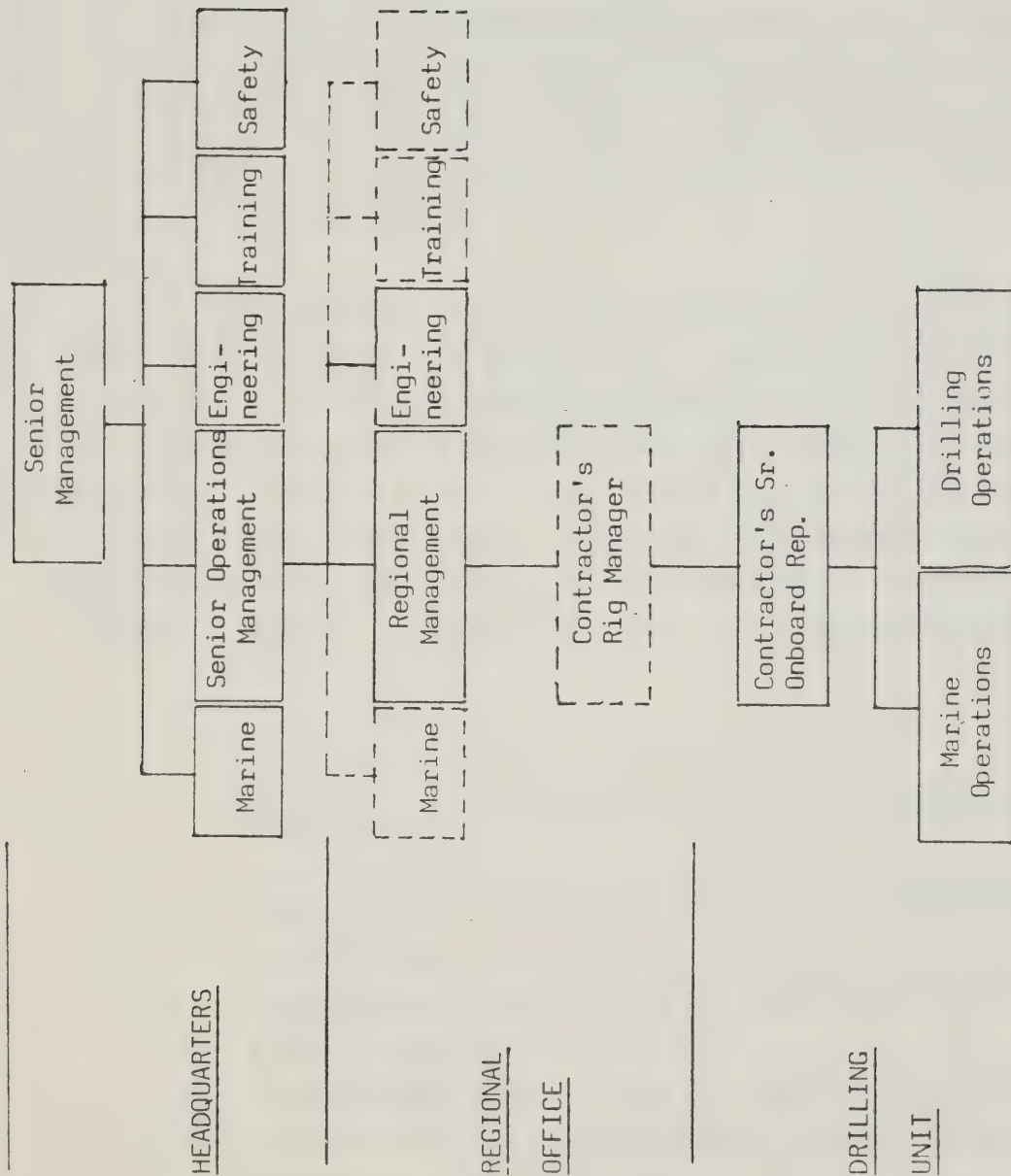
- Internal Operating Company policy and standards.
- Applicable Government regulations in place at commencement of the program.
- Regulatory changes that come into effect during course of the program.
- Inspections carried out on the drilling unit by both the Operator's and the Contractor's safety and operations representatives.
- Inspections carried out by the Regulatory Authorities.
- Instructions and/or policy changes generated in Operator's headquarters and Contractor's headquarters.
- Technical and operational improvements emanating from Operator's and Contractor's organizations.
- Safety meetings carried out on the drilling unit with monitoring and feedback reports.
- Requests from Regulatory Agencies covering both Operator and Contractor activities.

The Operator's regional staff communicates directly with the Contractor's regional office staff who are generally structured as a distinct operational unit charged with the management and support of a specific drilling unit.

A typical offshore Drilling Contractor's organizational structure is outlined on Figure 4 - 3.

The Contractor's regional management will normally be directly involved in the negotiation of any agreements reached with the Operator in the contractual process and are, therefore, familiar with the Operator's policies and the applicable regulations.

FIGURE: 4 - 3



The Contractor's Regional management is responsible for ensuring that activities carried out by the drilling unit are in accordance with the operational and safety policies of the Contractor, the Operator's drilling program and the regulatory requirements.

As this is the main change

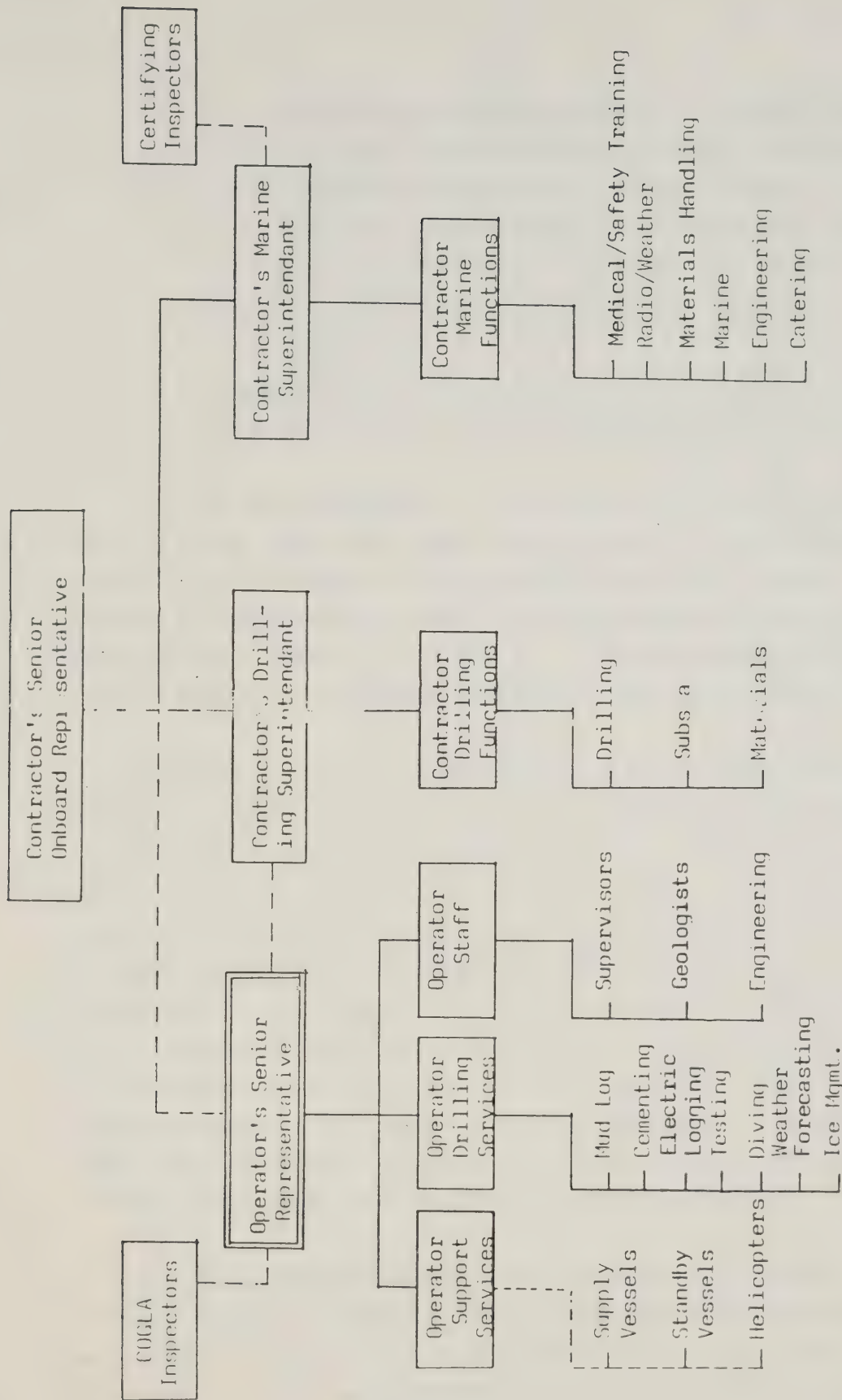
The Contractor's senior onboard representative on the drilling unit is responsible to ensure that instructions are carried out through delegation to the Contractor's drilling and marine supervisors. This responsibility is discharged in close liaison with the Operator's senior onboard representative.

The Contractor's control system during the operating phase is vested in the Contractor's regional management. Figure 4 - 4 outlines the functional and contractual relationships onboard the drilling unit that tie the Operator, the Contractor and the ancillary service groups together. The Contractors regional office must therefore be completely familiar with and be prepared to respond to the following issues in order to carry out its responsibilities.

- Contractor's policy and standards.
- Operators' policies and standards relating to the drilling unit.
- Applicable regulations governing Contractor activities.
- Inspections carried out by the Regulatory Authorities.
- Inspections carried out on the drilling unit by the Contractor's Headquarters Staff and the Operator's Regional Staff.
- Inspections carried out by Contractor's operation-

FIGURE: 4 - 4

ONBOARD FUNCTIONAL ORGANIZATION



----- Contractor/Operator Relationship

_____ Contractor/Employee Relationship

- al and safety representative on the drilling unit.
- Instructions and/or policy changes emanating from Contractor's headquarters organization.
- Instructions and updates emanating from the certifying authority, the insurer, and/or the flagging authority covering the drilling unit and its operation.
- Improvements originating from the Operator's and the Contractor's and head office organizations.

The key elements in the Operator's control process that tie the Operator's and Contractor's organizations together in a single working entity are the regular weekly and daily meetings between the operating representatives in the regional office. Figure 4 - 5 illustrates how the two organizations relate and identifies the key contact points.

The senior representatives in the regional offices meet on a weekly basis with their respective support staff in attendance to discuss the activities of the past week and the activities planned for the next week. The Operator's regional representative will identify any regulatory shortcomings or requests and look to the Contractor's representative to take the necessary action and report back in a subsequent meeting. The Contractor's past performance is discussed in detail as are the Operator's plans for future events. This communication process is normally very open and forthright with all key operational and safety issues discussed and courses of action defined.

The senior onboard representatives normally meet on a daily basis to discuss specific operational details. The meetings are again oriented toward a discussion of past performance and the detailed planning required to carry out

OPERATOR

Senior Management

General Contact

- Drilling Contract
- Safety Policy
- Key Business Decisions

HEADQUARTERS

HEADQUARTERS

Tech. & Admin. Support

Operations Manager

Support Services

Drilling Superintendant

REGIONAL OFFICE

Tech. & Admin. Support

Regional Manager

Rig Manager

Operations Management Contact

- Safety Policy & Reporting
- Drilling Contract Administration
- Regulatory Reqmts
- Operational Issues

REGIONAL OFFICE

Support Serv. Rep.

Senior Onboard Representative

Regulatory Agency Inspectors

DRILLING UNIT

Senior Onboard Representative

Certifying Agency Inspectors

DRILLING UNIT

Daily & Task Contact

- Safety Control Meetings & Rep.
- Reg. Directives
- Drilling Program Interpretations
- Instructions to Contractors
- Dr. Contract Detail
- Liaison with Onboard Personnel

the activities of the next 24 hour period. They will also discuss requests for information from their respective regional management groups and review orders or directions emanating from their regional offices.

This process, normally conducted in a scheduled manner, is altered as necessary to deal with key activities, specific problems, or changes in the base program. Discussions are held in a team oriented approach with Operator's and Contractor's onboard representatives and their support specialists contributing based on their individual responsibilities and specific skills.

The overall control process meets with varying degrees of success due to personalities, frequent personnel transfers and differing levels of competence. It is the responsibility of senior management to ensure that good working relationships exist and that the personnel assigned to these key roles are in fact competent and able to communicate in a positive fashion under the pressures of an ongoing offshore program.

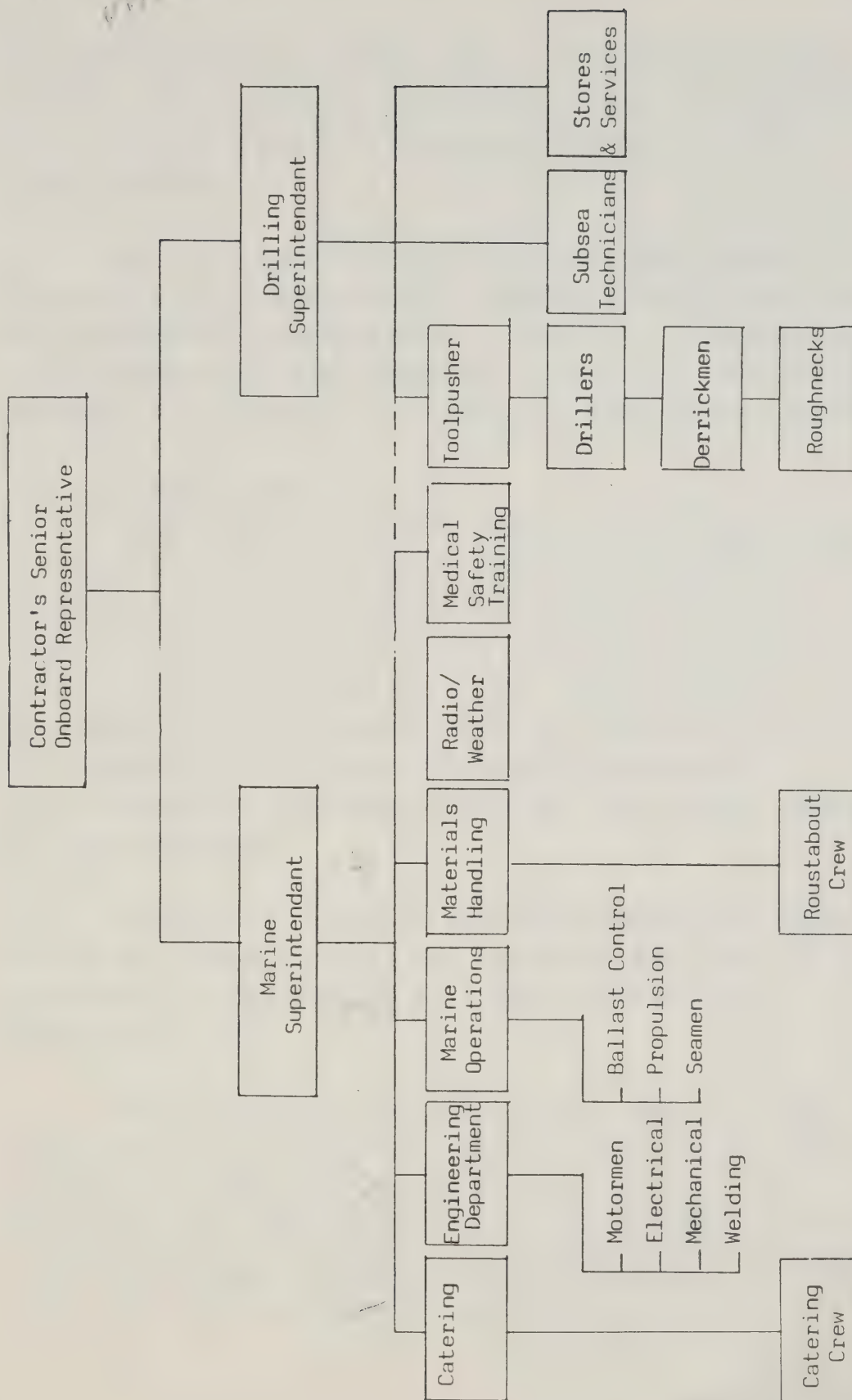
4.2 CONTRACTOR'S ADMINISTRATION OF ONBOARD PERSONNEL

The Contractor's principal method of communicating policies, standards and instructions to the onboard personnel is through the station bill and through verbal instructions from the Contractor's onboard supervisors to employees and third party service personnel.

A typical Contractor's onboard organizational structure is shown in Figure 4 - 6. There is some variation in organizational structures between the marine oriented and the drilling oriented Contractors and a particular Contractor's organization will vary in some respects from

FIGURE: 4 - 6

CONTRACTORS ONBOARD ORGANIZATION



the hypothetical case shown here. The structure does, however, cover the main functional groups and positions, and will serve as a guide to understanding the reporting relationships.

The total onboard personnel complement, shown in Figure 4 - 4, is made up of a number of individuals outside the Contractor's organization. Figure 4 - 7 shows how these individuals along with those of the Operator and the casual visitors are organized for onboard safety control measures.

4.2.1 Station Bill

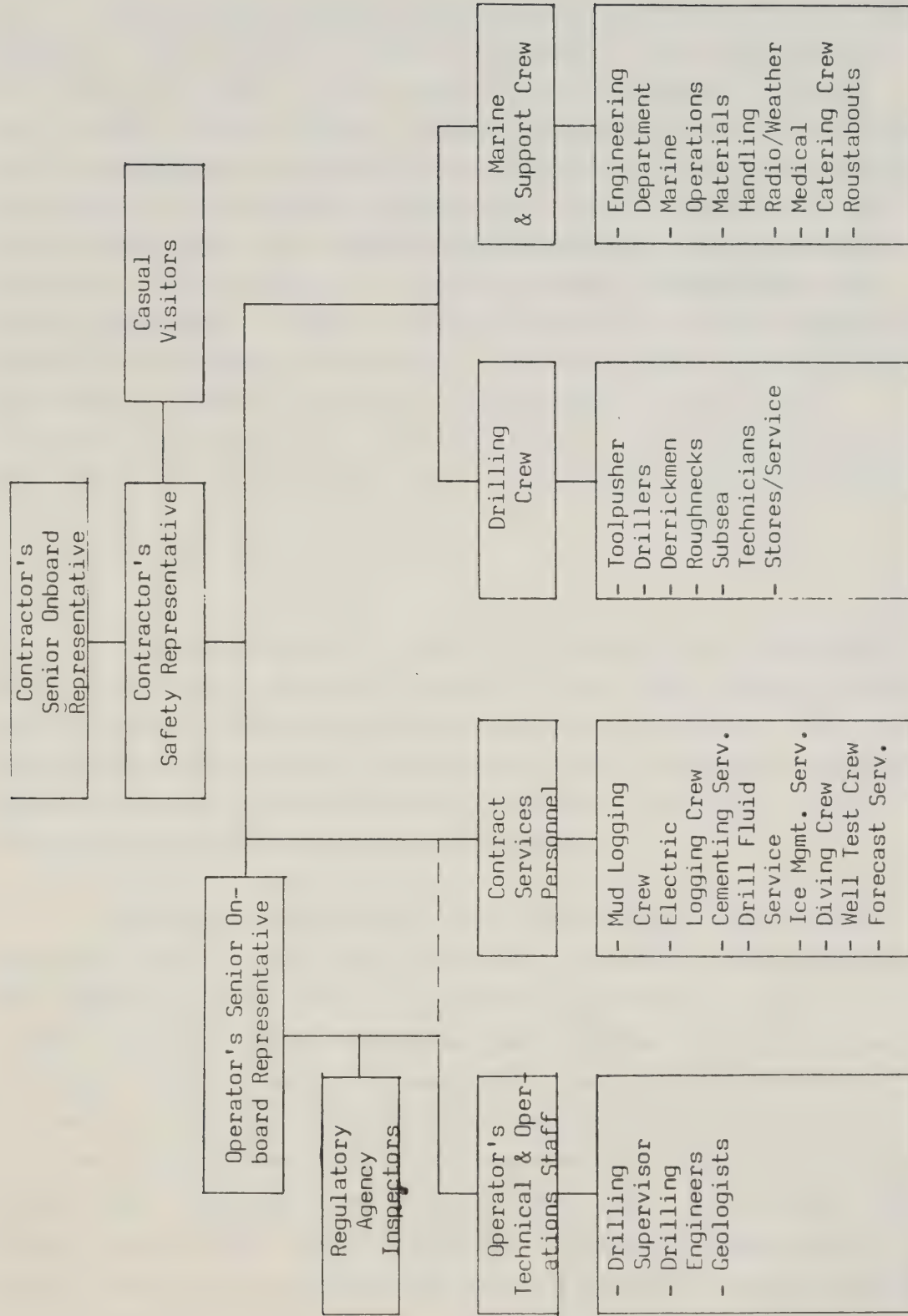
The formal method for communicating basic safety policies and procedures to the onboard personnel is the Station Bill. The purpose of the Station Bill is to ensure that all personnel onboard know the basic arrangement of the drilling unit, the location of the safety equipment and understand their responsibilities and duties in the event of an emergency. The Station Bill outlines specific instructions for emergencies such as fire, vessel evacuation and man overboard.

Personnel currently working offshore have some basic marine emergency training and therefore are aware of the importance of the Station Bill and its associated procedures.

The Contractor normally assigns one individual the responsibility of ensuring that all personnel are briefed and familiar with the Station Bill on arrival. New Contractor employees, Operator representatives and service company personnel are given detailed briefings on their first visit to a particular vessel.

FIGURE: 4 - 7

ONBOARD SAFETY REPORTING RELATIONSHIPS



Most Contractors follow this procedure in a diligent manner. The success or effectiveness of the process is generally mirrored in the particular Contractor's basic philosophy toward safety. Contractors continually are faced with a tendency to complacency in this more or less routine element of the safety program. It is the opinion of the study team that the Contractor's surveyed are currently placing a high emphasis on training and preparedness for their personnel. This is shown in their attitude toward the onboard communication process. The fact that this process is totally people oriented suggests that it requires constant vigilance to ensure that all personnel are aware of the risks and understand their individual responsibilities.

4.2.2 Verbal Instructions

The Contractor's internal training and development program is built around a series of job descriptions which provide each individual with a general outline of his duties and responsibilities. The Contractor's employees are aware of the system, and their particular role in that system, before they arrive onboard the vessel.

The job description outlines routine tasks in a general manner. The individual is instructed verbally on the specific tasks he is expected to perform by his immediate supervisor. This normally takes the form of an ongoing dialogue within a working group or team and/or through an informal instruction session prior to a non routine task. Generally the supervisor of a particular functional unit, such as the drilling crew, the engine room crew, the ballast control crew or the marine operations crew, will hold a meeting at the beginning of each shift to

discuss the day's work and the associated safety considerations and potential hazards.

A formal safety meeting, including all departments, is scheduled on a regular weekly basis, where specific problems or concerns are discussed. The meeting will usually have, as its theme, a topic of interest covering a pending specific event such as a rig move, a production test, or running the sub sea equipment. The discussions will familiarize all personnel with the particular task and the relevant safety issues will be highlighted.

These sessions are structured to provide two way communication to enable individuals to express their concerns and ideas. The proceedings of these meetings are formally documented and distributed through the Contractor's regional office to the safety department in the head office.

The meetings are attended by the Operator's onboard representative and those third party service representatives that are directly involved in the particular operation. Inspectors from Regulatory Agencies attending these meetings gain an insight into the workings and the dynamics of the drilling unit, its personnel, and the overall safety control system.

4.2.3 Emergency Drills

The third system of communication with the onboard personnel is through the mechanics of the emergency drills. The drills are normally structured to include an instructional component, the drill itself, and a formal review or critique meeting on completion of the drill. This

allows the Contractor's safety representative to communicate policies, procedures and regulations to the employees and to hear their concerns, questions and suggestions. This process is also documented and forwarded through the Contractor's regional office to the safety department in the head office.

Concerns or questions raised by individuals in the daily and weekly meetings and at the emergency drills are documented and form a part of the overall control and reporting process. There are several forms of employee representation in the safety management of an operation. Some are required by flag, some by regulation but most are developed in the interest of maintaining a harmonious and safety conscious crew complement.

This system is as successful as the participants want it to be. All personnel from senior management through rig supervisory staff to the employee, have a responsibility to the process. The system will not be successful if either management or the employees are not dedicated to the process.

The study team is of the opinion that Contractors and their employees are currently very safety conscious and that the communication process outlined above is an effective one. Several Contractors indicated that the process, because it is people oriented, is not self sustaining and that it requires constant "tops down" pressure to ensure that people are aware, concerned and supportive of the process. It is therefore essential that senior management from both the Drilling Contractor's and the Operator's organizations be totally and visibly dedicated to the safety programs.

4.3 REGULATORY AGENCY ADMINISTRATION OF INDUSTRY SAFETY

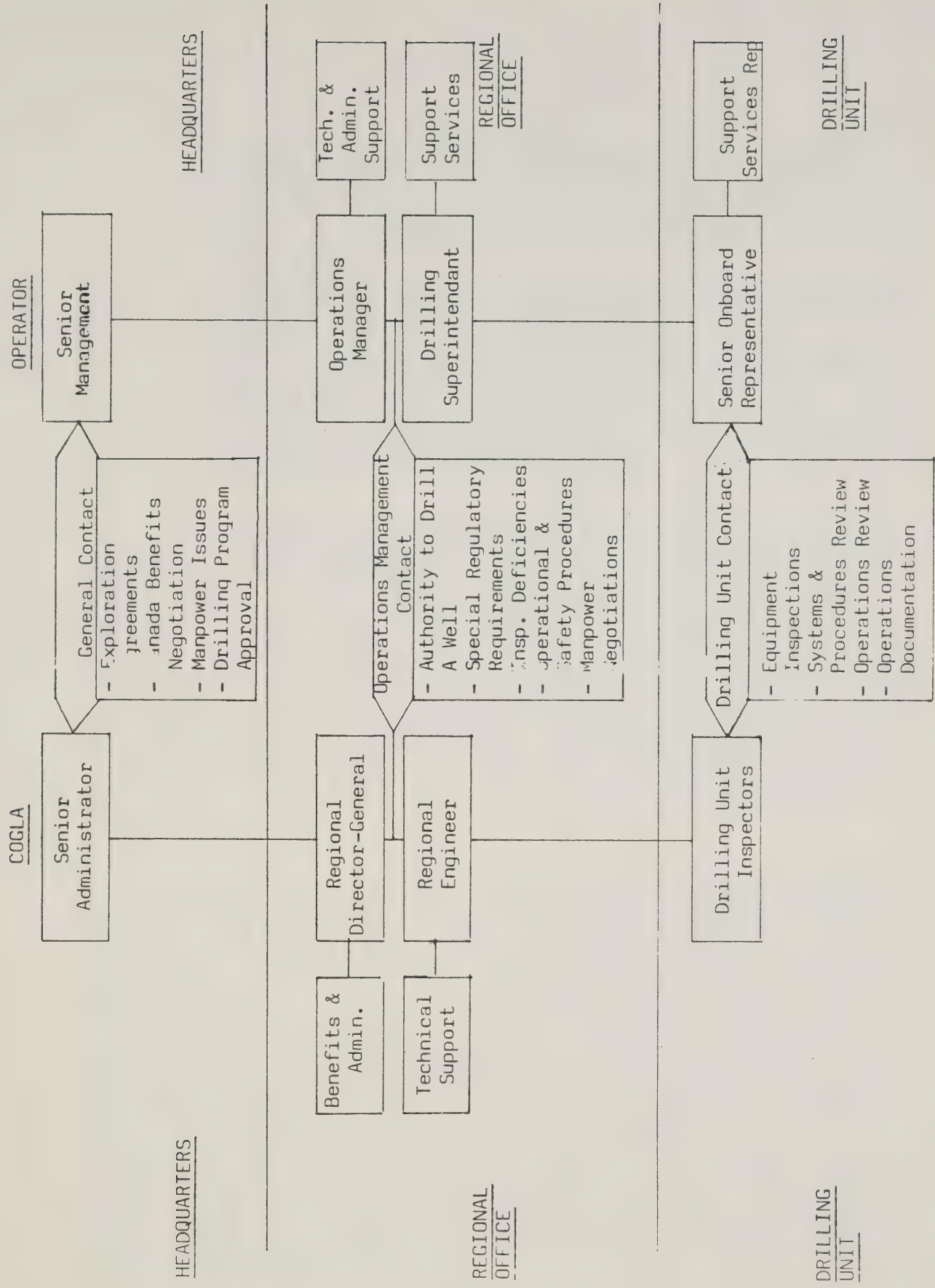
This section deals with the mechanisms which the Regulatory Agencies have put in place or which have otherwise evolved to facilitate two way transfer of information between Industry and Government on activities, programmes and requirements on safety related issues. Dialogue between Regulatory Agencies and Industry on safety related items occurs in at least three ways:

- Direct (formal or informal) liaison with individual Operators and Industry groups such as Canadian Petroleum Association (CPA), Canadian Association of Drilling Contractors (CAODC), and Petroleum Industry Training Service (PITS).
- Discussion of Industry submissions to Government for approvals of programs and plans.
- Discussion on the development and effect of new Government requirements in the form of directives, guidelines, etc.

4.3.1 Government Contact Points and Liaison with Industry

Although there appears to exist no formal consultative mechanism for liaison with the Industry, both COGLA and NLPD maintain contact with Industry through a number of informal and semi-formal means. Figure 4 - 8 represents the primary contact points between Industry and Government. Examples of these contacts are outlined below.

- direct contact with individual Operators involved offshore Eastern Canada by Agency officials in the



- course of performing their regulatory duties;
- informal contact with Industry groups such as the CPA and the CAODC for advice on general issues as they arise;
- circulation of draft regulations to Industry for comment before final issuance;
- direct participation in Government and Industry committees formed to address specific items. This is often accomplished through Industry groups such as PITS in the case of training.

The primary contact between Industry and Government is through the Government's ongoing monitoring and inspection process. Both primary Regulatory Agencies conduct regular on-site safety inspections. The emphasis of these inspections is on the drilling and well control procedures outlined in both Government's drilling regulations. Additional inspections take place during special operations such as formation testing or the setting of crucial casing strings.

COGLA relies on the Canadian Coast Guard to conduct certain inspections of marine lifesaving equipment. Such inspections appear to be infrequent, perhaps once or twice a year, or whenever a new rig is brought into an area. CCG also conducts yearly inspections of Canadian and foreign flag support vessels operating out of Canadian ports. With the implementation of the proposed Mobile Offshore Drilling Unit (MODU) Standards, CCG will be responsible for inspection and certification all Canadian flag MODU's to these standards, and of all foreign flag MODU's on COGLA's behalf under the terms of the Memorandum of Understanding between COGLA and CCG.

Written reports on all inspections are prepared and circulated within Government and a copy is also provided to the Operator.

Although both the primary Regulatory Agencies have direct contact with individual Operators they do not liaise directly with Drilling Contractors. Contractor representatives sometimes participate, at the request of the Operators, in meetings and committees formed to address particular safety items.

One key area of concern relates to CCG's isolation from the Operators and the Contractors. Although CCG is basically responsible for marine equipment and procedural issues, it has no formal contact with the Contractors, who are the owners and operators of this marine equipment. The Memorandum of Understanding between COGLA and CCG provides a direct contact with the Operator. However, the concern remains that there is no formal link between CCG and the Contractor except in the case of Canadian flag drilling units.

The NLPD on the other hand, has provided a direct contact with Drilling Contractors through the classification societies. Four agencies have been appointed as acceptable Certifying Authorities by the Petroleum Directorate. They act on behalf of the Petroleum Directorate in certifying the drilling units through a formal Certificate of Fitness process, which is necessary before approval can be granted for a drilling program.

COGLA does not now make direct use of classification societies as does NLPD. CCG will, however, require normal class certification of drilling units under the proposed new

MODU standards, as it does now for certification of Canadian flag support vessels.

4.3.2 Government Approval of Industry Submissions

Initial contact between Government and Operators with respect to safety issues is made with the submission of an application for Drilling Programme Approval. A prospective Operator seeking Drilling Program Approval is required to present a detailed application to the Regulatory Agency. This information covers the following matters:

- geological and geophysical overview of the area,
- physical environment of the area,
- logistics of the drilling program,
- description of the drilling unit,
- drilling program and well design details,
- oil spill response program,
- contingency plans in the event of emergencies.

During the period in which the drilling program is under review, the prospective Operator may be called upon to provide additional information or to clarify points in the application. It is normal for Agency inspectors to inspect the proposed drilling unit before the drilling program is approved. The prospective Operator is expected to make the necessary arrangements for the inspection with the Drilling Contractor.

The Operator must seek an "Authority to Drill a Well" for each individual well in a Drilling Program. This is a licence to drill a particular well within an approved drilling program using the drilling procedures, well control and blowout prevention procedures, and the evaluation program described in the Operator's application.

In addition, the Operator must submit a Contingency Plan setting out procedures to be followed in the event of foreseeable accidents such as oil spills, injuries, vessel damage, etc.

The Agency may withdraw the Authority to Drill a Well when the safety of an operation becomes uncertain owing to either the level of performance of the drilling unit or the environmental conditions encountered in the area being more severe than those predicted by the Operator and used in the development of the Drilling Program.

4.3.3 Government Safety Directives to Industry

A formal statement of special requirements is sometimes issued by a Government Agency as a result of its monitoring and inspection activities or as a result of some internal policy decision, in the form of a "directive".

The scope of these directives is usually limited to a particular issue and their application may be to one Operator or to Industry as a whole. Most directives are in the form of a letter to the Operators. The purpose is to bring the Operator's attention to an apparent hazard, that may not be covered by a specific regulation. A directive could also be utilized to notify Operators of accidents experienced by other Operators conducting similar activities.

Guidelines are usually developed from such directives and safety notices, in order to make important directives apply generally. Initial directives are

confidential in that they are Government-Operator specific. Safety notices and guidelines on the otherhand are public documents. Collections of guidelines are organized into booklet form and published periodically.

5.0 CRITICAL ASSESSMENT OF SAFETY MANAGEMENT

5.1 OPERATOR'S MANAGEMENT OF SAFETY REGIME

5.1.1 General Assessment

The Operator's ability to work effectively with the various Regulatory Agencies, within the boundaries of the Regulatory system, is reflected in the number of areas where Industry is working in harmony with Government in managing offshore operations.

There are a number of areas that would indicate Industry and Government are making significant progress toward an effective safety control regime. These would include the following.

i) All Operator's expressed the opinion that they are able to conduct operations within the scope of the regulatory regime, while still meeting their own internal policies and procedures.

ii) Operators indicated that they generally have a good working relationship with the prime or first line, Regulatory Authorities. This positive relationship is borne out in discussions with the prime Agencies.

iii) All Operators expressed a commitment to comply with all new regulations since they feel that the Regulatory Agencies are working diligently to ensure that any new regulations are tested off with Industry for their operational and technical feasibility before being implemented. Some concern remains, however, with respect to the handling of the more political oriented regulatory issues.

iv) There is a feeling on the part of the Operators that COGLA has expressed a basic trust in the procedures and the judgements exercised, particularly on the part of the experienced Operators. This provides an atmosphere where both parties are mutually supportive in conducting day-to-day activities and in identifying critical issues that require study and/or improvement.

v) There appears to be general agreement in Industry and Government that regulations are more meaningful and workable if they are generated through the joint efforts of Industry and the Regulatory Authorities.

5.1.2 Critical Issues

The Operators and Regulatory Agencies feel that the Operators have the basic ability to work with Government and the Drilling Contractors to create and maintain a safe offshore working environment. However, a number of issues were identified within the study process which would indicate that there are areas of weakness or potential weakness in the Operators management of the safety regime. These are included in the following outline.

i) The current Regulatory control system forces the Operator to communicate directly with COGLA on all issues including those that directly involve the Drilling Contractor's specific marine procedures. Most Operators lack inhouse expertise in the area of marine equipment and procedures, which has traditionally been the domain of the Drilling Contractor, and are therefore not in a position to effectively represent the Contractor in these issues. The Operators on the other hand, are comfortable with the system since they remain in complete in control of the costs that

result from any modifications required as a result of direct discussions between CCG and the Contractor as an example.

ii) Operators have traditionally worked in isolation from each other on issues that directly affect their competitive position. There are many safety related activities that can best be solved by a cooperative, industry wide approach.

Groups such as the EPOA and the newly formed CPA/OOD have demonstrated that they can be effective. The EPOA Offshore Safety Task Force is a good example of how Industry can work together as a group in concert with the Contractor's Association and the Regulatory Agencies to address issues and problems of mutual concern.

The support of the CPA/OOD, by individual Operators, is not consistent and as a result a few Operators carry the majority of the load. This lack of unanimous support not only has a tendency to dampen the enthusiasm of the key supporters but also to reduce the variety and amount of innovative solutions.

An area of concern expressed by Government and by some of the environmentalists in Industry relates to the confidentiality of environmental data. There is a significant amount of data on weather, sea state and ice occurrences collected by the Operators that is unavailable to the public domain because of confidentiality agreements. These agreements are in place to protect the Operator who has spent a significant amount of money to collect the data necessary to fully evaluate the conditions in his operating area. Industry has a need to share all the information

available to ensure that it has as complete a picture as possible of the unique Canadian environment.

iii) The state of development of lifesaving equipment and procedures for use on MODU's is significantly behind that of MODU's themselves. There appears to have been a tendency for the Operators to delegate the responsibility for development of this equipment to the Drilling Contractors who further delegated it to the manufacturers of lifesaving equipment.

The general concensus from the study indicated that the marine industry and the manufacturers in particular do not have a true understanding of the needs of the offshore drilling industry. It would, therefore, seem necessary for the Operators to take an active role, along with the Contractors, in the initiation of research and development programs directed at the equipment needs for the unique Canadian offshore environment.

iv) There have been a number of accidents during the past several years involving support vessels colliding with MODU's. These accidents occur when the vessels are working alongside the drilling units and appear to be related to the failure of sophisticated propulsion control systems. The problem is further complicated by the fact that most support vessels do not utilize bow mooring lines when they are discharging or loading materials alongside the drilling unit.

The support vessel owner, although under direct contract to and administration of the Operator, requires a very close working relationship with the Drilling Contractor whose drilling unit he is in fact supporting. The Drilling

Contractor and support vessel operator are however forced to work out their mutual concerns at arms length through the Operator who lacks a basic knowledge of the marine equipment and procedures in question.

v) Lifesaving drills are not being conducted in a consistent fashion because of various opinions surrounding the viability and desirability of scheduled versus random drills. Operators are not in agreement on a single approach to the problem. Some Operators have taken a position in favour of the random system, which is in general disagreement with the Drilling Contractors. The concern here relates to the Operator's understanding of the Contractor's personnel and their motivation. It is questionable if the Operators are in fact qualified to discuss the relative merits of random versus scheduled drills or to negotiate arrangements with the prime Regulatory Agencies that would dictate the use of one system over another.

vi) The effectiveness of support vessels deployed in the standby mode gives rise to the question of whether the vessels are in fact dedicated to basic safety requirements and not compromised by the supply/service needs of the Operators overall support network. This issue is also related to the three way relationship that exists between the Operator, the Drilling Contractor and the support vessel operator. The practice of using the normal supply vessel for a standby vessel between supply trips has become widely accepted. The potential problem occurs during the critical time between the arrival of a support vessel loaded with supplies and the departure of the vessel previously on standby duty. There is a legitimate concern that the supply vessel, while unloading or while still carrying deck cargo, may not completely fill its role as a standby vessel. This

Warning
Light Bulb
Drilling Contractor

would necessitate greater vigilance to ensure adequate overlap in the attendance of the vessels at the drilling unit.

vii) There would appear to be a lack of acceptable statistical data on accidents involving personal injury occurring in offshore operations to enable Industry to evaluate its safety performance. It is difficult to assess the real areas of weakness and to direct the proper corrective efforts without a valid information base.

viii) There is a general consensus that Industry should be participating more aggressively in the development of joint Industry/Government search and rescue systems, recognizing the limited SAR resources at hand and the vastness of the east coast exploration activity. The merits of offshore weather stations and SAR support bases in the key operating areas have not been fully evaluated. These ideas have been brought forward on a number of occasions but Industry has only recently taken an active role in the analysis of the relative merits of the systems.

ix) Training is perceived to be an area of weakness within Industry. Operators are beginning to work in concert with the Drilling Contractors and the Regulatory Agencies to define the requirements and to develop a coordinated Industry approach to the issue. The prime concern in this issue relates firstly, to the definition of who requires the training and secondly, to the definition of who is responsible for that training.

Since the training requirements seem to be directed at the offshore workers and since the offshore workers are primarily employees of the Drilling Contractors, it would

appear that the Contractors should be the key participants in the development of any training programs or facilities.

There has been a great deal of controversy over the subject of training, originating from the Operating Companies and the Regulatory Agencies, that was not conducive to a workable solution to the perceived weakness.

It appears that the Operators are gaining a better understanding of the Contractor's training requirements and constraints, but, a degree of concern remains in that Operators may be using the promise of training for local personnel as an added sweetener in their discussions with the employment benefits groups within Government to aid in the negotiations for exploration agreements.

x) There is a concern that the Operators are not consistent in their overall attitude to safety in the context of a safety management philosophy. Safety can only be achieved through the true commitment of management and operating personnel. Some Operators feel that there may be a need for all Operating companies to take an indepth review of internal safety philosophies and policies to ensure that commitments exist and that the individual responsibilities are well understood. Training in risk and safety management and the development of safety organizations that specialize in the offshore environment have been suggested as a means for Operators to gain better understanding of all aspects of the safety control regime.

It should be pointed out that an overreaction in this area, leading to a proliferation of safety measures and studies, would be totally counter-productive and could

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easily interfere with the basic need to ensure safety awareness and responsibility on the part of each individual from the trainee level to senior management.

xi) There is a concern on the part of some experienced Operators that the new Canadian Operators tend to accept onerous Canada benefits and local employment requirements in their negotiations to secure exploration agreement approval from COGLA. Meeting these negotiated requirements during the operating phase, may compromise the overall safety regime and in turn create unacceptable precedents within the Industry. These Operators felt that COGLA had developed a more objective approach to Canada benefits and employment in recent months. However, the concern was valid and should not be overlooked.

xii) The study team was left with a basic feeling about Industry's reaction to changes or anticipated changes in the regulatory regime. Many Companies and individuals within those companies tend to overreact to what they perceive a new Regulatory Agency will do in light of major Industry happenings or in view of regulatory actions taken in other jurisdictions or countries. The normal reaction on the part of Industry has been one of self-defence. This position of self-defence has the tendency to prevent positive discussion on a particular issue. This is because of the fear on the part of industry that any indication of Industry's willingness to entertain a proposed change would be taken as acceptance by Government. Several Industry representatives indicated that Government also has a tendency to overreact in these situations due to political pressures or due to an inability to fully evaluate a particular issue in a realistic timeframe.

It appears to the study team that overreaction is prevalent on both sides of the regulatory regime and that the solution lies in a better understanding of each side by the other.

xiii) There is a lack of understanding on the part of Industry and Government with respect to each other's objectives, organizations, and day to day activities. Senior representatives on both sides of the regulatory regime are confused by the intricate internal organizations and their workings. The more junior staff levels and those individuals who make contact on an infrequent basis are even more confused. It is evident that a number of the areas of concern in the overall safety regime stem from this basic lack of understanding. Comments from both Industry and Government indicated that personnel exchange programs and formal orientation seminars and courses would go a long way to bring about an understanding of the basic elements of Industry and Government activities.

5.2 DRILLING CONTRACTOR'S MANAGEMENT OF SAFETY REGIME

The Contractor's ability to ensure that all onboard personnel comply with Government safety policies and the Operator's and Contractor's operational requirements is reflected in the number of areas where the Contractors have developed positive working relationships with the Operators and indirectly with the Regulatory Regime.

A number of the Contractors have been actively participating with the Operators in the development of safety equipment and procedures. They have also been able to develop indirect channels of communication with the secondary Regulatory Agencies in areas of technical and operational specialization.

The Contractors have also put a significant effort into developing the framework for an effective training and development program for their personnel.

There are, however, a number of areas of weakness in the Contractors overall management of the safety regime.

i) There is a lack of consistency on the part of the Contractors in their support of and participation in the Contractor's Association, CAODC. There are three key members of the group that appear to carry the majority of the load with two other casual participants. Several Contractors working in Canadian waters do not support the association. Since the Contractors are somewhat isolated from direct communication with Government, it is felt that they need to speak with a unified voice in order to have an effect on current policies and procedures. The planned evacuation guidelines currently in effect are the result of a direct agreement between the Operators and the Regulatory Agencies with little input from the Contractors. The suggested adoption of a random approach to emergency drills, which is contrary to the wishes of all Contractors, has also been the result of direct Operator/Government discussions.

ii) Most Drilling Contractors have not taken an active position in research and development activities related to the improvement of lifesaving systems, hardware and procedures. The majority of the personnel on the drilling units are employees of the Drilling Contractor, and their welfare and safety must be viewed as the responsibility of the Contractor.

iii) There are obvious concerns on the part of the Operators, and the Drilling Contractors, over the number of workboat related accidents. Since the workboats are contracted to the Operators, the Contractors are forced to deal with the problem at arms length through the Operators.

Some Drilling Contractors feel that they must take a more active role in conjunction with the Operators in developing procedures for the safe operation of workboats in the vicinity of drilling units. They feel that their efforts in this direction are not effective because of the three way relationship between themselves, the Operators and the supply vessel owners.

iv) There is a feeling in Industry that the certifying agencies have relaxed their diligence in the inspection of the drilling units and as a result the overall safety standards have been compromised. The inspection and certification process is a service to the vessel owner, the Drilling Contractor, and it is therefore the responsibility of the Contractor to demand performance on the part of the certification agencies.

There is a great deal of variation in the Drilling Contractor's procedures with respect to quality assurance in the construction of new drilling units. A number of Contractors provide a complete staff of technical personnel in the shipyard to protect their interests. Other Contractors exercise very little control in quality assurance other than that provided by the builder and the certifying agencies.

v) The suggested adoption of the random approach to emergency drills is against the best judgement of all Contractors interviewed. The arguments put forward are valid but the Contractors have no mechanism to take these arguments forward in a formal coordinated fashion.

X vi) There is some question about the effectiveness of the systems for ensuring employee involvement in the safety regime. Some Contractors indicated that there is a need to evaluate employee participation in and feedback from the safety control process. Their concern about the effectiveness of the process was amplified by some of the regulatory personnel interviewed. This issue, if not dealt with in an open and forthright fashion by all Contractors, could result in some extremely cumbersome rules and regulations that would undermine the traditionally strong employee/Contractor working relationships.

vii) There is a great deal of concern in Industry and Government on the question of the marine oriented versus the drilling oriented command hierarchy onboard the drilling units. The Contractors through their association, expressed a definite need to address this basic issue in detail and to provide the Regulatory Authorities and the Operators with a strong Drilling Contractor's position. Failure to address this issue has the potential to create significant operational, organizational and safety problems within the Industry, not only in Canada, but worldwide.

viii) The Drilling Contractors vary in their basic approaches to the training and development of their personnel. A number of Contractors use a mix of inhouse and

external training courses and facilities. Other Contractors depend largely on outside facilities for their training needs. Either system appears to be effective, however, there is a definite need to develop a consistent approach to coordinate the overall training process. The need for some degree of standardization is evident as is the need for a system of certification for key elements of safety training. The Contractors are generally concerned that the Operators, under pressure from the Regulatory Agencies, will adopt a system of compulsory training and development that may not be in the best interest of the Contractors or their personnel.

There is general agreement within the ranks of the Contractors that they must take a very active role in this process.

ix) The Drilling Contractors vary in their overall attitude toward safety. Some Contractors make a special effort, through their senior managerial and operational personnel, to ensure that they maintain a continuing awareness of the importance of safety and that they develop safety programs that are dynamic and effective. Other Contractors tend to develop more static safety programs that create a tendency to complacency at all levels in their organization.

Several Contractors expressed a concern that the Operators and the Regulatory Agencies did not have a complete understanding of the contracting business and that they tended toward formal regulations to ensure compliance with a strong safety ethic. These Contractors felt that safety is more dependent on individual awareness and that

this is achieved through a more dynamic involvement by all personnel in an organization.

5.3 ASSESSMENT OF REGULATORY AGENCY LIAISON WITH INDUSTRY

5.3.1 General Government Liaison

In general the direct relationship between the primary Regulatory Agencies and the Operator with respect to safety management works well. Operators agree that they are able to comply with Government requirements and requests without jeopardizing their internal safety procedures.

Procedures followed, to deal with deficiencies or problems encountered as a result of Government inspection and monitoring activity, appear to work well. In general the housekeeping items are dealt with immediately between the field inspectors and their contacts with the Operators and Contractors. The larger or more complex issues are made the subject of meetings between the Agencies and the Operators to decide on a satisfactory course of action. Particular problem items often become the subject of a continuing dialogue which has led to gradual progress toward solving the problem. This cooperative approach has generally replaced the precipitate and unilateral action which often occurred in the early stages of Regulatory Agency development.

The relationships between Regulatory Agencies and Drilling Contractors does not seem as satisfactory as those between Operators and Drilling Contractors. This is largely

because these relationships are not as well defined and they exist at arms length through the Operator. Since the Operator may not be as cognizant of the Contractor's internal policies and philosophies, he may not properly represent them to Government. Contractors, therefore, should have the opportunity to deal on a first hand basis with secondary Regulatory Agencies such as Canadian Coast Guard in the case of the Federal system, or with Certifying Authorities acting on behalf of the Newfoundland Government.

Some progress has been made toward resolving this problem. Drilling Contractor representatives and representatives of secondary agencies such as Canadian Coast Guard are often included in technical meetings to discuss new or proposed requirements, so that Contractors are able to bring their particular expertise and experience to bear. There remains a need, however, to give Contractors and Contractor groups a stronger input and a closer involvement in the regulatory process.

5.3.2 Industry Involvement in Development of Regulatory Requirements

The procedures followed by Governments in designing, drafting and modifying regulatory requirements vary widely. In particular, there is great variation in the stage at which, and the extent to which Industry is involved in the development of regulations.

In the case of the federal regulatory system, prior to the formation of COGLA, the Resource Management Branch of

EMR made extensive use of Industry's internal standards as a basis for designing Government's safety regulations covering drilling activity. With the advent of COGLA, and the development of a larger, more experienced staff, there was a tendency to formulate new regulations entirely inhouse using individual staff or ad hoc committees, with no direct input by Industry representatives in the development stage. Drafts of these new regulations are circulated to Industry Groups and to individual Operators for comment. The stage at which Industry input is solicited is not consistent. In some cases, Industry considered that their opinions were solicited too late in the process to have any effect.

In the case of the Newfoundland regulatory system, a similarly wide variation in Industry involvement is evident. In the case of drilling regulations, the federal legislation was adopted with some modification, and without direct Industry input. However, in developing the Offshore Installations Regulations and the accompanying guidelines, similar U.K. legislation was used as a starting point, but Industry representatives were directly involved in the drafting of the legislation. An international advisory committee was convened consisting of individual Operators and Contractors, industry groups, classification societies, academics and labour regulators. Despite the conflicts inherent among such a heterogeneous group, a final set of requirements was drafted.

The unilateral issuance of new requirements in the form of "guidelines" and "directives" is also the cause of some concern on the part of Industry, who feel that such measures are often arbitrary and reactive. However, during the study period, Governments have begun to involve Industry

by inviting comment on specific issues and inviting Industry's analysis and suggestions as to how these issues might be addressed. If Industry's responses are deemed adequate, the suggested measures are made into guidelines which apply industry-wide. For example, such a procedure was followed with the most recent Federal Winter Drilling Guidelines.

6.0 ASSESSMENT OF THE OVERALL EFFECTIVENESS OF THE COMBINED INDUSTRY/GOVERNMENT SAFETY REGIME

There has been a significant degree of improvement in the safety of offshore operations over the study period. Industry and Government are working together in several key areas where there are common concerns and mutual understanding of the weaknesses in the system. Significant steps have been taken by Industry and Government in implementing new ideas, new equipment and new systems and in the development of an industry oriented, training and development program. Industry and Government have reached a reasonable level of understanding of each other's roles and objectives. It is the opinion of the study team that the most significant development over the study period has been the marked improvement in safety awareness on the part of employees, supervisory staff and senior management.

The Canada Oil and Gas Lands Administration organization has matured significantly in the two and one half years since its inception. Industry has grown to accept that COGLA can be an effective control mechanism and is working with the regional and headquarters offices with a more open and cooperative attitude. The local administration of federal government policies through the COGLA Regional Offices has been a positive step in improving communications between Industry and Government.

The NLPD organization has developed a strong working relationship with the Operators and because of its formal use of outside certification Agencies for vessel fitness inspections, appears to have a strong formal communication with the Contractors.

The regulations currently in effect along with the various guidelines and requirements that have been issued over the past two years are being met by Industry to the satisfaction of the Government Agencies. Drilling activities themselves are well regulated in the opinion of Industry personnel. The Operators have made significant progress in developing an effective Industry voice in the amalgamation of the CPA and EPOA associations to form the CPA, Offshore Operators Division, an effective operations oriented group that has the support of Industry management and the respect of the Government Agencies.

There has also been a definite relaxation of some of the more politically oriented, local employment, goods and services issues that had undermined the working relationships between Government and Industry early in the study period.

The areas requiring attention and that give rise to varying degrees of concern are generally the marine oriented or non-drilling issues. These range from a general or overall concern around the administration of marine operations on Canada's continental shelf, outside the 12 mile limit, to some very specific concerns around basic offshore Industry practices and procedures. The study team has identified a number of these specific issues in earlier sections. Many of the concerns are common to both Industry and Government departments and to individuals on either side of the Regulatory Regime. In an attempt to provide a meaningful assessment of the regulatory control process the study team has had to look beyond the specific issues and concerns toward a more global view of Government and Industry, and the operating and business environment in which they function.

The environment, described in Section 2.0 of the study, is complex, everchanging, physically hostile and politically sensitive. In the time covered by the study period a large number of changes have taken place. Government has undergone major organizational restructuring and many new functional departments have taken a sudden interest in the offshore industry. The Industry itself has made a transformation from the predominance of the multi-national, major operators and large multi-rig international Contractors to the new Canadian independent Operators and a group of Drilling Contractors with a complete range of equipment types and a variety of operating styles.

The changes that have taken place over the study period appear to have stabilized. The Industry activity level is reasonably static and the Government Agencies are working toward a structured approach to regulation. Many of the pressures that were driving the system in 1980 and 1981 have been removed or have ceased to exist.

It would seem that this stabilization and development of maturity would create an atmosphere that would allow Industry and Government to develop a mutually satisfactory relationship. This, however, has not been the case since there are still a number of serious concerns facing the Canadian offshore industry in the areas of safety and operational procedures.

The study team reviewed the list of concerns raised in discussions with Operating personnel, Drilling Contractors and Government Agencies and found that the majority of the concerns relate directly to the operations of the Drilling Contractors, the well-being of the Drilling

Contractor's personnel and the Drilling Contractor's marine procedures and equipment. There were very few concerns raised about the relationships or activities around drilling program approvals, exploration agreement negotiations or the administration of the geological aspects of the regulatory control system. Some areas such as well control and blowout prevention were given high marks of achievement from both Industry and Government.

The marine issues such as onboard command hierarchy, planned evacuation, and marine emergency training are creating significant concern and frustration on both sides of the Regulatory Regime. The study team has attempted to illustrate the organizational interrelationships that exist in the Canadian offshore industry in an effort to gain a better understanding of the problem. Figure No. 6 - 1 shows the main groups involved and the key vehicles or arrangements that connect these groups together. It may be helpful to trace the steps in the normal sequence of events that an Operator follows in implementing an exploration program to gain an understanding of the diagram. The following steps are oversimplified for clarity.

1) EXPLORATION AGREEMENT

The Operator, through its exploration department, negotiates an exploration agreement with the Land Management branch of COGLA. The Operator's Canada benefits department will also be involved in these negotiations.

2) DRILLING CONTRACT

For purposes of this illustration we make the assumption that the drilling unit meets the technical and safety requirements of COGLA's Engineering Control branch.

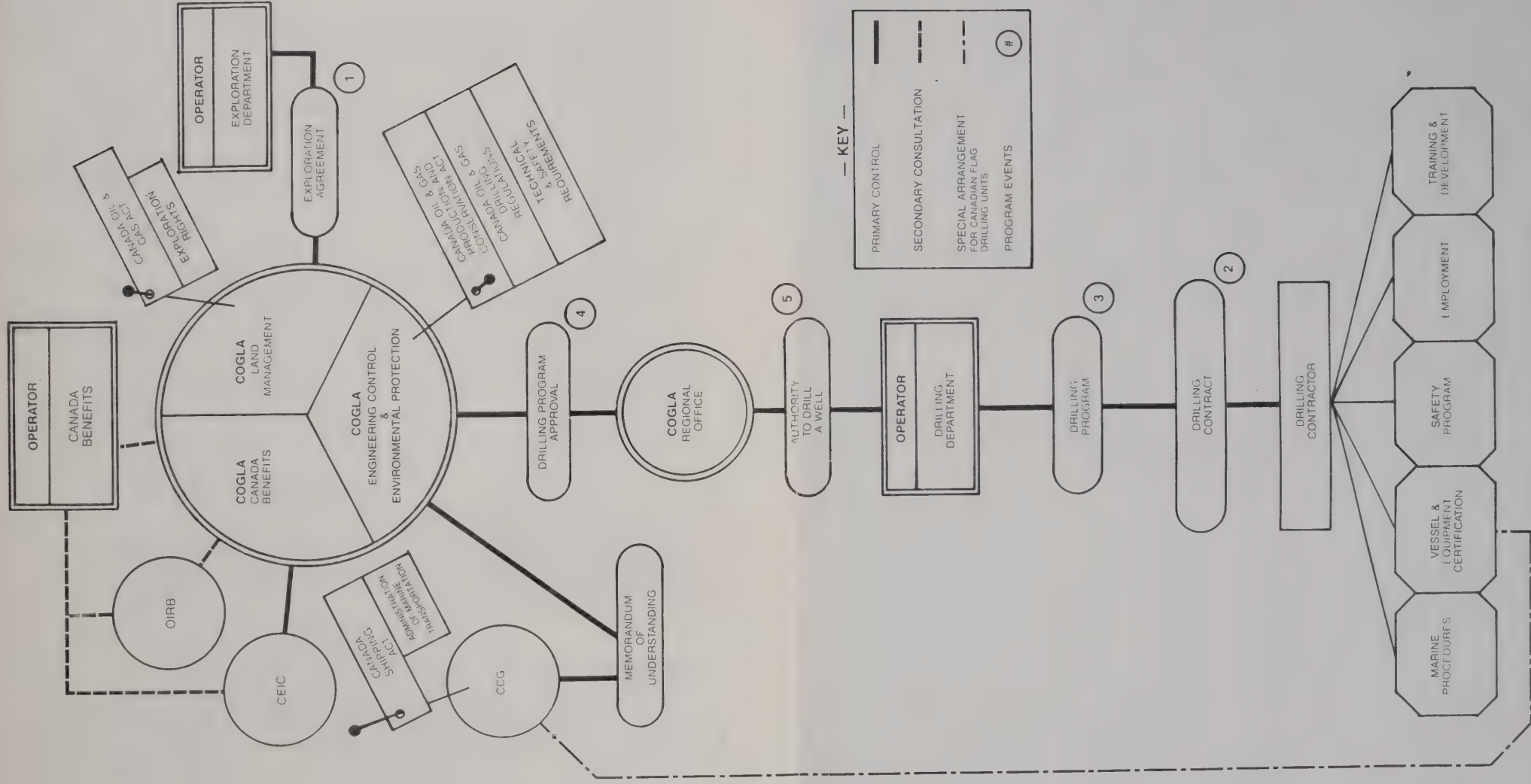


FIGURE: 6-1 CONTROL REGIME FOR EXPLORATORY DRILLING ON CANADA LANDS

The Operator, through its drilling department, will negotiate a contract with the Drilling Contractor for the use of a drilling unit and crew. This is the main control document between the Operator and the Contractor in that it specifies not only the business arrangements, but also the technical specifications, operating requirements and regulatory responsibilities of the Contractor.

3) DRILLING PROGRAM

The Operator's drilling department, in conjunction with the Drilling Contractor, develops a drilling program covering all general aspects of the project from site specific surveys through Contractor's operating procedures and safety programs, well design and well control systems, to contingency plans and oil spill control measures. This is carried out according to the technical and safety requirements outlined by the various Regulatory Agencies.

4) DRILLING PROGRAM APPROVAL

The Operator submits an application for Drilling Program Approval which is reviewed by COGLA, and following any necessary revisions or upgrading, approval is granted by COGLA.

5) AUTHORITY TO DRILL A WELL

The Operator, having completed the detailed drilling program design, submits an application for Authority to Drill a Well to the COGLA regional office. Again, following any necessary revisions or upgrading, approval is granted by that office.

The Operator is then in a position to carry out the drilling program according to the requirements defined in

the approval process which include compliance with all regulations.

One particular player in the regulatory approval process that is conspicuous by its absence, is the Drilling Contractor. Another player, conspicuous in its multifaceted appearance, is the Operator with exploration, Canada benefits and drilling departments involved at different times with many different agencies.

The vast majority of the concerns and problems defined by the study team fall into the following main categories:

- Marine Procedures
- Vessel and Equipment Certification
- Safety Program
- Employment Issues
- Training and Development

Since the Drilling Contractor owns the drilling unit and since the majority of the people onboard the drilling unit are the Contractor's employees, it becomes evident that all the critical issues are under the direct responsibility of the Drilling Contractor who is found, quite literally, at the end of the regulatory diagram.

The elaborate control and approval process that connects COGLA and its main branches with the Operator and its many departments does not allow the Drilling Contractor direct access to a single Government body, with the exception of a legal contact with the CCG if the Contractor happens to have a drilling unit with a Canadian flag.

The problems, confusion and responsibility for performance and compliance, in areas relating to marine procedures, marine safety and the training and development of personnel are imposed on the Contractor, who is on the end of the control chain with no legal, approved or accepted means of discussing critical issues with knowledgeable personnel in the Control Regime.

The Operator on one hand prefers to maintain the single window contact with Government because of the obligations committed to in the Exploration Agreement and Drilling Approvals. The Operator also prefers to remain in direct control between the Contractor and the technical control Agencies, because the cost of any arrangements between the Contractor and CCG, for instance, is eventually passed on to the Operator. It is, therefore, only good business practice for that Operator to require some control over spending.

The Operator therefore, partly because of the Canada Lands Approval System and partly because of a need to control costs, takes it upon himself to represent the Drilling Contractor on many issues that directly relate to the Contractor's people, equipment and procedures, an area in which the Operator has little expertise.

The Drilling Contractors feel that many of the concerns would be better understood if there was a formal, legal process that allowed the Drilling Contractors to deal directly with the technical control specialists in the secondary Regulatory Agencies.

There have been a number of attempts to develop a system that would allow the Contractors to become more involved in the control process especially in the highly specialized equipment and personnel issues. There are a number of "underground" communication links that have been developed by concerned individuals in the Government Agencies and with the Contractors, but they are not able to prevent the prime Agencies from dealing directly with the Operators on Contractor related business.

The two Industry associations, CPA/OOD and CAODC, have begun to take an active role in the development of a more formal review and appeal process. The CPA/OOD was formed in late 1983 by the amalgamation of the East Coast Petroleum Operators group and the CPA. This group has been very effective in the past and has established a strong working relationship with Government on behalf of the Operators.

The CAODC on the otherhand has only recently become active in regulatory control issues. The group is not totally supported by the individual Contractors with only 3 or 4 members taking an active, meaningful role in the groups activities.

A lot of work remains to be done to strengthen and tie these two associations together to close the control loop and eliminate the communication gap between the Contractors and Government.

CRITICAL ISSUES

The major areas of concern identified by the study team are grouped into the three main categories outlined

below: Marine Equipment and Procedures, Marine Safety, and Personnel Training and Development.

MARINE PROCEDURES

i) Lifesaving Equipment

Lifesaving equipment and systems for the evacuation of MODU's are only effective in relatively moderate sea states. A significant amount of work has been done on the development of better lifesaving equipment and techniques during the past two years. There remains, however, some significant gaps in the technology available within the conventional maritime industry. It is, therefore, essential that the offshore Industry, and the Regulatory Agencies governing that Industry, direct their efforts toward a thorough evaluation of this problem. The Canadian Industry must put forth an extra effort to ensure the unique aspects of the Canadian environment are considered in these developments. This effort should bring new ideas and philosophies to the table and perhaps stimulate the marine industry to develop a better understanding of the offshore drilling Industry's unique needs. This in turn should result in the development of better lifesaving equipment and systems.

ii) Immersion Suits

There have been a number of positive developments in the field of immersion suits beginning with a series of Industry/Government studies during 1981. This work continues in an effort to improve the capabilities of this important safety device. An area of concern remains in that the bulkiness of the suits, having the greatest thermal protection restricts their use in helicopters. There is a concern about an individual's ability to escape from a

helicopter, down at sea, wearing the bulky suit. This concern has dictated the use of a less bulky suit with a corresponding reduction in thermal protection. Most offshore personnel feel that there is more likelihood of a helicopter accident than that of a rig accident and therefore the need for full thermal protection is greater when flying than when onboard the drilling unit.

There is an obvious need to evaluate this situation in light of helicopter design, operation and crew training as well as training for the passengers in an effort to improve survival capabilities for offshore air travellers.

Since the area of control over helicopter operation and safety is far removed from the regulatory regime governing offshore drilling it is difficult to visualize how these specific concerns can be handled. In this case Government and Industry must not only evaluate the technical issues but also strive to develop a more direct and simplified controlled system that will ensure the safety of helicopter operations serving the offshore industry.

iii) Support Vessel Collisions with MODU's

There were a number of incidents where supply vessels have collided with MODU's during the study period. The majority of these incidents appear to have been caused by the failure of the sophisticated propulsion control systems on the new generation support vessels. There is a feeling on the part of the Drilling Contractors that the supply vessel owners should be evaluating the use of bow mooring techniques to hold the supply vessel away from the rig in case of loss of propulsion control. The Contractors also see a need to evaluate the basic design philosophies

used in the supply vessel industry. This is needed to ensure the systems in use on the vessels supporting the MODU's, are in fact designed for the task and not modifications of diving support or construction support applications.

Industry is concerned that those individuals and/or agencies governing the qualifications and certification of supply vessel officers do not adequately understand the complexities of these special vessels and their operation. Concerns were expressed about the adequacy of training, qualifications and on the job experience required for the senior command positions on board supply vessels operating in Canadian waters. These vessels are highly sophisticated and their use is somewhat unique. Personnel from the merchant marine and the fishing industries require special training and a significant amount of on the job experience before they are qualified to operate these specialized vessels alongside the MODU's.

iv) Administration of Continental Shelf Marine Activities

The lack of a consistent approach to the administration of activities in Canada's Continental Shelf waters is one of the main concerns facing Industry and Government Agencies. There will continue to be a significant amount of confusion, duplication of effort, inconsistent interpretations of regulations, and the possibility of an oversight leading to a serious accident, until this basic legal question is answered. A strong working relationship between the Drilling Contractors, the owners and builders of the drilling units, and CCG is essential to the administration of a strong safety regime. That relationship cannot be

expected to develop without a basic definition of CCG's responsibilities and roles which are in turn directly related to the Country's overall administration of its waters.

SAFETY PROCEDURES

i) Emergency Drills and Exercises

There currently exists in Industry, as well as in Government, a basic disagreement on the philosophy of conducting emergency lifesaving drills and exercises onboard the drilling units.

One school of thought advocates some form of regulatory control forcing the Contractor to hold these drills on a random basis to eliminate the complacency on the part of personnel theoretically created when drills are conducted on a scheduled basis. The opposite school of thought, which includes all of the Drilling Contractors and most of the Operators, believes that random drills do not remove the tendency to complacency and in fact can create unnecessary hazards to onboard personnel. It is essential that Industry reach a consensus on this very basic element of safety training before unacceptable systems, governing the Contractor's management of their employees, are either adopted or regulated by Operators or Government.

This is another example of the potential problems that can be created when parties who are not totally familiar with the subject make decisions without input from the parties who are directly affected.

ii) Planned Evacuation

The philosophy of planned evacuation of MODU's prior

to impending bad weather requires serious review on the part of Industry and Government. The policies and procedures currently in effect were adopted by Industry as the result of political and public pressures. It appears that there was little, if any, indepth technical or operational evaluation work done with the Contractors. The procedures are inconsistent and the basic philosophy is not universally accepted by either the Contractors or the Operators.

This is an area where Industry and the Government Agencies must work together first of all to define the true need, and secondly, to identify the potential hazards before developing a solution. This must be done to ensure that only the true aspects of safety are considered in total isolation from the political pressures.

iii) Standby and Recovery Vessel Deployment

design vessels equipment
Concerns were expressed on the part of some of the Contractors with respect to the deployment and dedication of supply vessels in the standby role. Supply vessels double as standby vessels in most east coast operations. Contractors feel that the standby role may be compromised from time to time when vessels are changing functions at the rig. The consequences of mixing the roles can create a situation where the newly arrived supply vessel is still off loading when the standby vessel is released to return to the marine base to resume its supply role. Should an emergency occur while the supply boat is off loading it may not be in a position to respond immediately in its standby role therefore leaving a serious gap in standby coverage.

A second area of concern with respect to the use of supply vessels in the standby role has to do with the

effectiveness of their recovery equipment and techniques. Industry has adopted the latest state of the art equipment and techniques. Industry and Government Agencies both expressed concerns that the level of training and development of the support vessel crews is not in keeping with the stage of evolution of the equipment. It is therefore essential that Industry and Government reach an understanding on these training requirements and establish a program and the facilities to ensure these crews are well versed in the use of the equipment. The Industry should also investigate the development of a set of standards that would guide the support vessel crews in rescue exercises.

TRAINING AND DEVELOPMENT

i) Command Hierarchy

An area of concern that is shared across Industry and within Government, relates to the onboard command hierarchy in effect on MODU's. COGLA issued a set of guidelines in late 1983 which specified that floating drilling units require an individual responsible for the safety of the unit, qualified in marine matters, who possesses a recognized master mariner's certificate. Although Industry has complied with this guideline there is a great deal of controversy around the issue and it gives rise to serious concern within Industry.

Industry is not in agreement with the premise, assumed in the guidelines, that marine expertise necessarily denotes added safety. There are Contractors who feel they can demonstrate a strong safety oriented philosophy and good safety record that is not based on the maritime command ethic. These Contractors feel that an individual with a master mariner's ticket does not necessarily have any more

knowledge of the design or operation of a semi submersible with its complicated ballast control, deck loading and stability characteristics, than an experienced, drilling oriented, individual with a good technical background in ballast control, mooring and manoeuvring activities and safety/survival systems.

Drilling Contractors are seriously concerned about Government Agencies issuing guidelines, with the strong suggestion of political pressure, on highly specialized technical issues without a thorough analysis of the requirements.

These Contractors and some Operator's personnel find it difficult to imagine that the forced introduction of a master mariner into an organizational hierarchy based on the Gulf of Mexico or drilling oriented management style, will necessarily improve safety. In fact, this type of action could create enough confusion and misunderstanding to jeopardize the safety of the unit. The study team feels this issue requires an in depth evaluation to arrive at a rational solution as soon as possible.

ii) Training and Development

The training and development of offshore personnel has been of particular concern to Operators, Contractors and Government. The primary concern centers around the local employment issue and the resultant pressure on the Industry by Government to employ local residents. These pressures are applied directly through the Operators in the exploration agreement process. The Operators in turn, pass the issue on to their Contractors because the vast majority of offshore workers are infact employed by the Contractors.

Government objectives with respect to local employment issues are very highly politically motivated and in most cases directed toward the statistical performance of the local manpower office. Contractor's objectives with respect to employment on the other hand are related to performance, efficiency, safety and overall economics. These two objectives are not necessarily at odds but problems occur when Government, in an attempt to improve employment statistics, forces the Contractor, through negotiations with the Operator on exploration rights, to utilize local labour resources. These Government Agencies have little knowledge or understanding of Industry employment and development practices, and are therefore somewhat ill-equipped to deal with the complexities of the situation. The Operator who, because of the basic regulatory control process, represents the Contractor in discussions with the Government Agencies also lacks a thorough understanding of the issue. As a result Industry and Government take sides over an issue that critically affects the well being of the Contractors who have no formal mechanism to effectively represent their concerns.

The study team feels that a brief explanation of the basic elements of a typical Drilling Contractor's training and development philosophy may be of help in assessing the problem.

Training and development programs among the Contractors take many forms depending on the number of rigs in the fleet and depending on the Contractors overall attitude toward safety and efficiency. Obviously the one rig Contractor with little turn over will have a different approach from that of the multi-rig Contractor with large

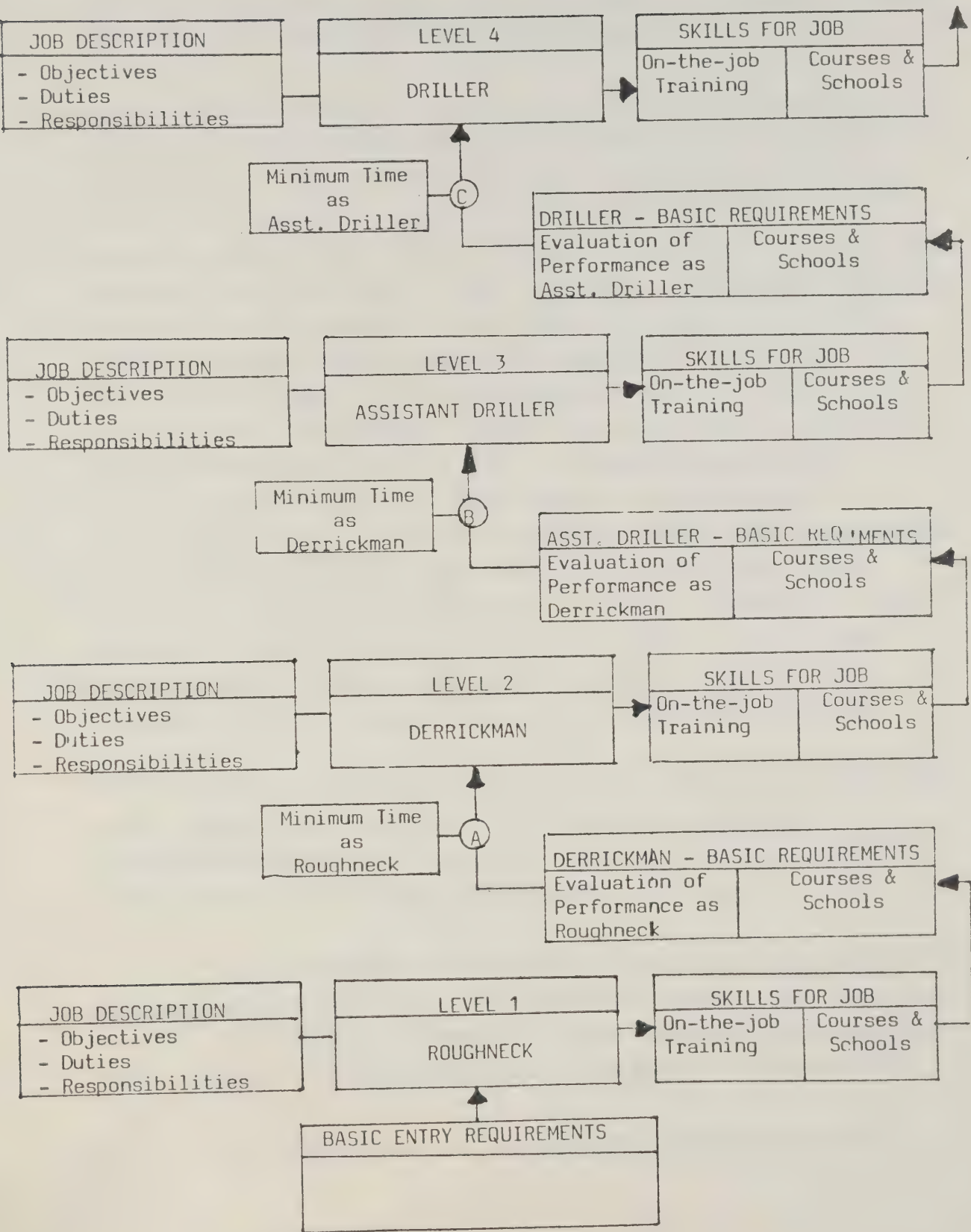
numbers of people moving from rig to rig and with normal turnover rates expected in the Industry. The Contractor who puts a great deal of importance on efficiency, safety and Industry credibility will have a different approach than the Contractor who is totally bottom line oriented. Irrespective of the Contractor's operating philosophy all training and development programs have a common, basic framework. The elements of this framework are the organizational structure, the individual positions in that structure, the detailed job descriptions for those positions and the career pathing or developmental patterns that tie the positions together.

The key elements of the process are the job description and the skill requirements for each particular position. Figure 6.2 illustrates a typical developmental progression program for personnel on a drilling crew as an example. Similar progression paths exist in the marine department, the mechanical department, and the ballast control group. Crossover links tying the various functions together are also provided to ensure that personnel, whose goals are high, will have a solid background in all functional areas that make up the total organization before they reach senior supervisory levels.

A Contractor will have basic entry requirements for the position of roughneck on an offshore rig which may include items such as education, previous experience on land drilling rigs, marine emergency training exposure, good health and attitude. When the Contractor identifies a need for a roughneck to either fill a position on a new rig or a position vacated by a promotion to derrickman or by a resignation or a termination, an individual will be chosen

FIGURE: 6 - 2

EMPLOYEE DEVELOPMENT PROGRAM



from a list of applicants that have been previously screened according to the basic entry requirement list.

The individual in the course of his employment as a roughneck will receive training in his specific job to enable him to do the work outlined in his job description more effectively and safely. The individual will also become aware of the overall organizational structure and the type of jobs available to him. He will be aware of the job description of the next level above his position and the training requirements needed to progress to that job. He will also be aware of the performance appraisal system in use and the relationship between his performance and the minimum amount of time he will be required to work as a roughneck before he will be eligible for promotion to derrickman. The roughneck therefore has all the information required to do his job well and to prepare himself for promotion to the next level when a vacancy develops. This process is repeated through the derrickman level to the primary supervisory position of assistant driller and eventually to the senior supervisory level of toolpush.

The process results in well developed personnel, who have a good understanding of the overall Contractor operating philosophy, who have a strong team oriented work ethic and who are highly performance oriented.

This example is obviously an oversimplification of the process as there are many external issues that alter or realign individual programs. It does however illustrate the basic approach to the structural development of personnel.

Any regulations or agreements between Government

Agencies and the Operators that interfere with this logical developmental process go against the Contractor's basic objectives of running a safe and efficient operation. Deviations will be a reflection on that Contractor's reputation in Industry, and can ultimately create dangerous anomalies in the system.

iii) Local Employment Issues

There are several references in the study to the fact that Industry and Government have adopted the best equipment, systems and procedures available to ensure continued improvement in the operations. The basic fact remains that the equipment and systems are only as good as the people who operate them. If the people are not qualified, if their performance is unknown, if they are not totally familiar with their company's procedures and philosophies and if they are not highly performance and team oriented the best equipment available is of little benefit. External employment pressures that interfere with the logical and sequential development of a strong team oriented work force must be questioned very seriously.

There have been examples over the study period where significant pressure has been used by Government to force the Operator, and in turn the Drilling Contractor, to hire a significantly higher number of local personnel than normal and thereby to disrupt the overall development process. The study team was not able to identify specific instances where these pressures created evident hazards to safety. There is however a very serious concern that this type of interference in a proven, logical, acceptable industry practice, by manpower agencies whose objectives have been at best somewhat myopic and at worst highly political, will create

situations that can lead to catastrophic events. Government manpower and employment agencies require a thorough understanding of the basic employment issues that characterize the drilling industry in order to ensure that the guidelines and regulations they develop are realistic. Some of these issues include:

- The exploratory phase of an offshore program is not highly people intensive. Agencies could use the exploratory activities to gain an understanding of the Industry and to develop the systems that will ensure optimum local employment when the labour intensive production development phase begins.

- The employment practices of the Drilling Contractors, when left to their own initiative, will attract the optimum level of local personnel into the Industry through the simple rules of supply and demand and basic economic reality.

A number of international Drilling Contractors have been working in Canadian waters and recruiting Canadian personnel over the past ten or twelve years. Their performance in the development of Canadian personnel resources in the offshore business is significant. This was accomplished in the course of simple business logic without any political pressures.

It is the opinion of the study team that the local employment issue in general, and the lack of a basic understanding of the drilling Industry on the part of employment agencies in particular, is one of the more serious problems facing the Industry and Government.

iv) Marine Emergency Training

The development of a marine emergency training process tailored for the Canadian Industry and its operating environment has been a particularly trying experience for all parties involved. The need for a basic universal procedure that prepares personnel for offshore assignments through development of an understanding of the equipment and the environment and a familiarization with emergency safety procedures is common to Government and Industry. The problems surrounding the development of a system to support this need appear to have been caused by the lack of understanding of either side by the other and by resulting action and overreaction.

Industry had acknowledged the need to follow up on a marine emergency training process initiated in the North Sea. There were no facilities in Canada tailored to the offshore drilling Industry and no agency or organization who could be charged with the responsibility for the development of such a facility. The NLPD recognized the need to take definitive action and since Industry had not demonstrated any visible progress in this direction a directive was issued that all workers attend the Marine Emergency Training Course at the College of Fisheries in Newfoundland. The NLPD recognized the course was not tailored to Industry needs but felt that they could work with Industry and the College to make necessary modifications to develop an acceptable program. Industry reacted negatively to this directive, not so much to the lack of suitability of the school, as to the manner in which the Government imposed the requirement without consulting the Industry. The problems appear to have been further complicated by the political and regional motivation and attitudes surrounding the issue. The problem was further complicated because the Operators

became deeply involved in yet another area in which they have little expertise, that of training Drilling Contractor personnel.

Several months of heated and at times relatively unproductive dialogue eventually resulted in all parties reaching a level of understanding and a commitment that will lead to the establishment of a program, tailored to the specific Canadian environment and to the equipment, systems and procedures in use by the offshore drilling Industry.

It is not unlikely that the Drilling Contractors, had they become officially involved early in the process, could have reached a suitable solution avoiding many of the frustrations and damaged relationships between Government and Industry and a large amount of valuable time.

In summary it is the feeling of the study team that the vast majority of the concerns shared by Government, Operating Companies and Drilling Contractors can be traced to the overall control system and the degree of isolation that system has created for the Drilling Contractors. Most of the critical safety issues are related to the Contractors equipment, his personnel and his operating philosophy.

The Contractor must however communicate his concerns and his position on these critical issues through the Operator who has only a general understanding of the Contractor's business and particular safety concerns. The Operator on the otherhand, because of his obligations to the Regulatory Agencies and because all expenses are for his account, needs to maintain control over the program and all of its components.

The secondary Government Agencies, who would be expected to have a better understanding of the Contractor's concerns because of their specialization, are prevented from direct formal contact with the Contractor. This separation of the knowledgeable players on either side of the regulatory regime has hindered progress and continues to create gaps in the level of understanding between Industry and Government.

There are a number of examples where directives or guidelines have been issued that were the result of direct discussion between prime Agencies and the Operators with little coordinated input from the Contractors. This is a serious weakness in the system that should be corrected if we expect Government and Industry to work together effectively to maintain the awareness of safety to ensure that Canadian operations are conducted soundly in the best interests of the employees, the Contractors and the Operators.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The study team believes that Industry has the overall ability, and the necessary opportunities, to work with the Regulatory Agencies in a positive and dynamic fashion to control its activities in a safe and effective manner. The physical and business environments in which the offshore Industry conducts its activities are highly complex and extremely variable. Regulatory control systems must therefore be based on a strong overall framework with general guidelines to ensure the basic requirements are satisfied. The systems must also have sufficient flexibility to allow Industry to operate safely and economically in the highly variable environment.

This is generally true in the area of drilling and well control regulations. The study team found that these areas are well understood by both Government and Industry. The priorities on well control procedures by both groups indicate the importance placed on the safety aspects of the operations.

The Industry is working closely with Government in the continual upgrading of well control equipment and systems, and the recent developments in the area of high pressure blow out prevention equipment have placed the Canadian drilling Industry at the leading edge of technology. The Regulatory Agencies have been closely involved in this process and are therefore comfortable with these developments.

It is important to point out that the overall well control process and the success of Industry's efforts in this critical element of the business are vested in a group

of individuals whose ability to prevent serious well control events depends on their constant awareness and their total dedication to the wellbore pressure detection process. The best equipment and procedures available coupled with the best training programs will be to no avail if these key personnel are not committed to maintaining constant vigilance and total awareness.

The control of marine equipment and procedures and of employment and development of offshore drilling personnel are not as effective nor are the issues as well understood as the more drilling oriented areas outlined above.

The philosophy and the technology related to lifesaving equipment systems and procedures is not as advanced as the drilling and well control systems. The systems in use for the evacuation of personnel from a MODU in rough weather conditions are inadequate. There is a significant amount of work being done to improve the Industry's capability in this area. This work, however, has been left to the conventional marine equipment manufacturers and it is the opinion of the study team that Industry and Government should take a more active role in the development of systems tailored especially for the unique needs of the offshore drilling business.

The development of regulatory controls for marine oriented issues and employment and development programs was given a high priority within Government during 1982. This created a great deal of pressure on a number of new and relatively inexperienced agencies. This pressure resulted in a tendency for these agencies to overreact in their

relationships with Industry which in turn caused a high degree of frustration in Industry. This frustration, manifested itself in an attitude of self defense and as a result the spirit of cooperation needed during a developmental stage was lost.

The relationship between Industry and Government has now matured to the point where the Operators and the Regulatory Agencies are working together in a cooperative atmosphere on many areas of mutual concern and the pressures that were driving the players apart early in the study period seem to have diminished.

There is, however, one major problem area that is seriously affecting Government and Industry's ability to reach an effective safety control regime. As outlined above, the weaknesses in the system are generally in the marine equipment and operations area, in the employment and development area, and in the safety aspects of both areas. These issues lie within the area of responsibility of the Contractors who own and operate the marine equipment and who employ and develop the personnel. Both areas are highly specialized and to a large extent peculiar to the offshore drilling Industry, in general, and to the Drilling Contractors specifically.

The problem facing Industry and Government is that the Drilling Contractors are officially isolated from those agencies in the Control Regime who are responsible for marine and personnel issues. The regulatory control hierarchy places two major components, COGLA as the prime Regulatory Agency, and the Operator (the Contractor's client), between the Drilling Contractor and the CCG on marine issues, and CEIC on manpower and training issues.

Neither COGLA nor the Operator have the necessary expertise to deal with these highly specialized issues, but because of the one window, one voice control philosophy, they are put in a position where they are making decisions and developing control mechanisms without formal effective input from the Contractors.

It is the opinion of the study team that these problems can be solved without affecting the basic structure of the control regime. The prime requirement is an effective direct communication link between the Drilling Contractor and those agencies specializing in Marine and Employment issues. The development of a system that clearly defines the roles and responsibilities of these secondary agencies will eliminate much of the confusion that exists on the part of Industry and many of the Agencies themselves. The adoption of a consistent marine administration policy covering all of Canada's continental shelf waters and a single control agency to administer that policy would eliminate the vast majority of the marine oriented concerns identified by the study. The development of strong, dynamic, operations oriented Industry associations that can act with authority and credibility would streamline the communication process on all Industry-Government issues of a common nature.

These three steps would provide the control framework and the communication loop necessary to directly connect all principal players in the control regime while maintaining the primary contact between COGLA and the Operator.

One final conclusion relates to the complexity of

the Governmental administrative hierarchy and the complicated organizational and functional structures within the operating companies. The study team identified a definite requirement for a cross pollination or technical/managerial exchange between Government and Industry. A system that would promote such an exchange would be met with a great deal of enthusiasm and would go a long way to promote a better understanding of each group by the other.

7.2 RECOMMENDATIONS

1. The roles and the responsibilities of COGLA and its ancilliary agencies must be defined. Overlapping roles identified in areas critical to the safety of offshore operations must be eliminated.

2. Industry, both Operators and Contractors, must develop strong, dynamic and operationally oriented associations to deal directly with Government and other Industries on issues common to the membership.

3. Marine lifesaving equipment and systems must be evaluated in light of the suitability, and capability necessary to carry out lifesaving functions in the environment in which the MODU's are capable of working. Industry should take a lead role in the research and development necessary to advance lifesaving technology to the level of technology of the drilling units themselves.

4. The use of a single immersion suit for helicopter travel and onboard survival needs should be evaluated. This would require coordination with the regulatory agencies

governing aviation safety who are not now directly tied to the offshore control regime.

5. There should be a direct connection established between the aviation safety control agencies and offshore control regime to ensure that offshore helicopter operations are in fact being monitored from a safety control standpoint.

6. The operation of supply vessels alongside MODU's should be evaluated to determine the reasons for, and the solution to, the number of collisions that have occurred over the study period. This should include the evaluation of propulsion control systems, the qualifications of supply vessel officers and the use of bow mooring lines when transferring cargo.

7. There should be serious consideration given to the establishment of the legal framework necessary to develop a consistent marine administration policy covering all of Canada's continental shelf waters. This is necessary to ensure that all MODU's are administered in a consistent manner regardless of vessel type or flag state.

8. The Drilling Contractors should evaluate the performance of the certifying authorities in their inspection and approval activities to ensure that these agencies are providing an effective check on safety equipment and procedures.

9. The Operators and Government Agencies should put publicity and politically oriented pressures aside when dealing with safety oriented issues. The controversy around

random versus scheduled emergency drills must be evaluated in isolation from these pressures by the Drilling Contractors who should then be given the responsibility to develop an acceptable system that meets the true safety requirements.

10. The guidelines covering planned evacuation from MODU's in the case of pending bad weather should be evaluated by the Drilling Contractors in conjunction with the Operators and Government to ensure that all aspects of this approach are considered again in the light of true safety requirements in isolation from external political pressures.

11. The Operators and Contractors should review their procedures and those of the supply vessel owners to ensure that the use of supply vessels in the standby role is not in anyway compromising the standby protection during the transfer or turn around of vessels in attendance at the drilling unit.

12. Industry and Government should develop a comprehensive system to gather and disseminate accident statistics in a consistent fashion that is specific to offshore drilling operations.

13. Industry and Government should continue to work with SAR in the development of joint search and rescue facilities and systems. They should also evaluate the use of offshore SAR support facilities and meteorological data measurement stations in the areas of concentrated offshore activity.

14. Drilling Contractors should review their practices with respect to safety meetings and the associated employee feedback, or critique process, to ensure there is an effective system through which offshore workers can express concerns and receive answers to their questions on safety issues.

15. Operators and Government Agencies must develop a strong understanding of the Drilling Contractor's organizational command hierarchy and the differences between the marine oriented and drilling oriented approaches. They should then allow the Contractors to demonstrate their individual capabilities in managing their activities in a safe and efficient fashion irrespective of a particular command philosophy.

Industry is in general agreement that there should be one individual on board a vessel who is in ultimate control at any given time. That individual must obviously be competent in his management and leadership capabilities and he must have a strong knowledge and understanding of both the drilling and marine aspects of the operations.

An individual with a marine background holding master mariner's status must have a broad exposure to drilling technology and operations and must be certified through accredited drilling and well control training systems to fulfill the role. Conversely a drilling specialist must have extensive marine operations exposure and be certified through accredited marine training systems preferably as a Master of Column Stabilized drilling units.

Regardless of the particular background the individual in command must have at his disposal a team of

competent, well trained individuals who have a complete understanding of the particular drilling unit, its systems and the environment in which it is working. The team must be comprised of specialists in drilling, ballast control and marine operations. They must have a positive working relationship based on a teamwork approach.

Operators and Government Agencies with little knowledge of the management of Contractor's personnel and operating systems should not interfere with the basic safety control philosophies of the Contractors. These systems have been developed over many years of experience and have demonstrated a good safety record.

The study team is of the opinion that Industry and Government should set aside differences surrounding the two management styles and work together to develop a consistent approach to the command hierarchy. The objective being the establishment of rules and regulations that would ensure strong basic safety requirements and yet allow the flexibility for Contractors with differing management philosophies to operate according to their best judgement.

16. Industry must develop an overall training, and development program based on the Drilling Contractors training requirements that will ensure a consistent Canadian approach to training certification, this approach must recognize international accredited schools and allow the individual Drilling Contractors to utilize inhouse training resources and philosophies.

Government must ensure that the regional political pressures are not allowed to compromise training and development ~~the~~ programs.

17. Industry and Government should continue the development of a marine emergency training program that is specifically tailored to the offshore drilling industry and that has universal acceptance in all Canadian operating regions.

18. Industry and Government should investigate the possibilities for the meaningful exchange of personnel in hands on work assignments of one or two year duration to give employees a strong working knowledge of the opposite side of the control regime. This would form an integral part of employee development schemes for government and industry..

APPENDIX A

TERMS OF REFERENCE

INDUSTRY MANAGEMENT OF REGULATIONS

OBJECTIVE

To assess critically the method used and the degree to which Operators and Drilling Contractors regulate the safety of Eastern Canada offshore drilling operations.

SCOPE

In addition to government imposed safety-related regulations, the Operators and Drilling Contractors currently active on the Eastern Canada offshore have internal safety-related policies and operating requirements. The study will compare the policies and operating procedures of these companies to the government regulations.

The study will investigate the method whereby the Operator ensures that the Drilling Contractor and other Contractors comply to Government safety regulations and to the Operator's safety standards.

The method by which the Drilling Contractor ensures that all personnel on the drilling unit comply with Government safety regulations and the Drilling Contractor's safety standards will be investigated.

The points of contact between the Regulatory Agencies and the Operators and Drilling Contractors for the transmittal of safety-related requests, proposals, or regulatory requirements will be determined. The points of contact between the Operator and the individual Contractors for the transmittal of regulatory and Operator safety requirements will also be determined.

TASK DESCRIPTION

1. A list of all of the Operator/Drilling Contractor combinations which operated in the Eastern Canada offshore in 1982/83 will be compiled. This list will form the basis of the study data but will not include the Mobil Oil/ODECO combination.

2. The company policies and operating requirements for each of the Operators and each of the Drilling Contractors which relate to safety will be outlined and compared to the relevant government safety regulations which are in place.

The areas of safety which will be addressed are:

a. Well Control:

This will include the well control equipment and procedures as well as the required formal training in well control. Requirements for drills, pressure tests, etc., will also be included.

b. Lifesaving Equipment and Procedures:

This will include both marine and industrial lifesaving equipment. The marine lifesaving equipment will include the equipment which is required to facilitate survival in a marine environment following the loss of a helicopter, supply vessel, or drilling unit. Industrial lifesaving equipment will include equipment which is required on Drilling Units such as fire extinguishers, gas masks, medical facilities, etc., for the onboard safety of personnel.

A.3

The marine and industrial life-saving procedures will include inspections, drills, etc., and will be concerned with the quantity and quality of such.

c. Marine Emergency Training:

This will include the training required of personnel to deal with a marine incident such as a helicopter crash, loss of a drilling unit, or loss of a supply vessel. It will deal only with the marine aspects of the training which is required to facilitate self survival or to facilitate the rescue of others.

d. Marine Procedures:

This will include the procedures and standards relative to the marine safety of MODU's. It will include standards and procedures relative to marine staffing levels, navigation, stability, positioning, avoidance of collision, and other factors which may affect the safety of the drilling unit.

3. The areas in which each of the Operator's or Drilling Contractor's policies and operating requirements differ from the Government Regulations will be noted, and an assessment will be made as to their effectiveness relative to the effectiveness of the Government Regulations.

4. An assessment will be made of the overall effectiveness of the combined Government and Industry safety regime. This assessment will highlight areas of inadequacy, areas of conflicts, etc.

A.4

5. The method by which each of the Operators ensures that the Drilling Contractor and all other Contractors comply with Government safety regulations and with the Operator's safety policies or operational requirements will be documented. This method may be in the form of contract terms, verbal instructions, written instructions, or by some other means.

6. Similarly, the method by which each of the Drilling Contractors ensures that all onboard personnel comply with Government safety policies or operational requirements will be documented.

7. The points of contact in the Operator's organization which are responsible for the transmitting of Government safety regulations and the Operator's safety standards to the Drilling Contractor and to other Contractors will be determined. The points in the Operator's organization which ensure that these regulations and standards are met will also be determined.

8. Similarly, the points of contact in the Drilling Contractor's organization which are responsible for the transmitting of Government safety regulations and of the drilling Contractor's safety standards to all onboard personnel will be determined. The points in the Drilling Contractor's organization which ensure that these regulations and standards are met will also be determined.

9. The points of contact in the Operator's and Drilling Contractor's organizations which are responsible for the reception of safety-related requests, proposals, or requirements from the Regulatory Agencies will be determined.

10. The points of contact between the Operator and the Regulatory Agency and between the Operator and the Contractor may be different. The method whereby the points of contact interact internally will be determined.

11. A critical assessment will be made on each of the Operators and Drilling Contractors as to the effectiveness of the organizations in ensuring that both Government safety regulations and the Operator's and Drilling Contractor's safety standards are met in a prompt and efficient manner.

APPENDIX B

LETTERS OF INQUIRY

DRAFT LETTER

TO

OPERATORS

Attention:

RE: ROYAL COMMISSION ON THE OCEAN RANGER MARINE DISASTER
INDUSTRY MANAGEMENT OF REGULATIONS

Dear

We have been retained by the Royal Commission on the Ocean Ranger Marine Disaster to prepare an assessment of the method used and degree to which industry regulates the safety of offshore drilling operations. The Chairman of the Royal Commission, Chief Justice T. Alexander Hickman, has outlined the terms of reference of the Commission in a letter to those resource companies currently operating offshore Eastern Canada.

Attachment #1 is a copy of a letter from Mr. R.G. Dyck, Studies Manager for the Commission, which further outlines the terms of reference and identifies those areas of specific interest in which the Commission is concentrating its efforts during Part 2 of its mandate. The prime goal of this second phase, as identified in Mr. Dyck's letter, is "To Identify Practical Means of Improving the Safety of Eastern Canada Offshore Drilling Operations". Attachment #2 is an outline of the terms of reference for the study being carried out by our group.

The Royal Commission is being advised by advisory committees, which include members from the resource and marine industries, and as a result is undertaking a thorough analysis not only of industry safety procedures, but also of the governmental regulatory regime. This stipulation on the part of the Commission to review both industry and government, is amplified by the fact that a parallel study to assess the effectiveness of the organization and management structure whereby governments regulate the safety of Eastern Canada offshore drilling operations, is being carried out concurrently. These two studies are mirror images in that they are essentially looking independently into the safety control systems on both sides of the regulatory regime. We are in close contact with Dr. Wilson Russell of National Petroleum and Marine Consultants, who are conducting the second study, and in fact, are collaborating with Dr. Russell on the study outlined herein.

The Commission's approach to the various studies allows for an evaluation of the key issues affecting offshore safety in an atmosphere at arms' length from the day-to-day activities of industry and government. We therefore believe that this particular study provides an excellent opportunity to present industry's side of the regulatory story in a forthright and unbiased fashion. We have followed the scope and direction of the Royal Commission in attempting to develop a study plan that will enable us to gain a true perspective of the regulatory process as it affects the Operator's ability to conduct operations in a safe fashion.

There have been a large number of studies initiated by the Royal Commission over the past months and the resultant call on information from the operators and contractors may create a significant work load. The Commission has recommended that the various consulting groups work together in conducting these studies to keep the work load on the part of industry and government to an acceptable level, while still achieving maximum benefit from the process. The Commission and the consultants appreciate the amount of work required in responding to these requests and are endeavoring to avoid duplication as much as possible.

The Royal Commission plans to present the results of the various studies in a conference scheduled for August, 1984. This is a further indication of the Royal Commission's desire to achieve a fair and open assessment of the state of the safety control system.

The individuals who will be responsible for this study into Industry Management of Regulations are outlined below:

The project will be managed by Mr. Ronald J. Bell, who has extensive experience in the petroleum industry, having spent 23 years in various aspects of onshore and offshore drilling activities. His offshore experience was gained working off the Canadian East Coast, in the Beaufort Sea, offshore Australia, and in

the North Sea. Mr. Bell has held positions with varying degrees of technical, operational, and managerial complexity with two multinational oil companies, a Canadian independent oil company and an international offshore drilling contractor. His last position was that of Vice President, Drilling, with the Canadian national oil company, Petro-Canada. He has worked with industry committees on safety and the physical environment in Europe and Canada.

Mr. Donald B. Webster has extensive drilling engineering, operations and management experience built up over 27 years in the drilling industry in Western Canada, the Beaufort Sea, the High Arctic, the Canadian East Coast, South America and the United States. Mr. Webster spent 23 years with the Esso organization in various engineering and operating positions with the company, as well as with Imperial Oil's company-owned drilling contracting organization. Mr. Webster's last assignment was General Manager, Operations, with Petro-Canada's drilling department. He was responsible for the company's extensive land and offshore drilling operations. Mr. Webster has been active on industry committees on the standardization of well control equipment, systems and regulations.

We will be assisted in the study by Dr. Wilson E. Russell of National Petroleum and Marine Consultants Ltd. of St. John's, Newfoundland. Dr. Russell has extensive experience in the petroleum industry on the Canadian East Coast, the Eastern Arctic and the Beaufort Sea. He has conducted research, performed and managed many consulting studies, and has been directly involved in the development and administration of government regulations. He has chaired advisory committees and liaised with national and international regulatory and industry bodies.

We feel that the combination of hands on industry and government experience represented in this association, along with the considerable international operations exposure to regulatory systems in both highly government-controlled and in self-regulated systems, will enable the team to make a fair and independent assessment of the industry's safety control regime.

The team's basic approach to the study will be to concentrate on general topics, supported by detailed issues from both positive and negative aspects. We recognize that generally most operators have developed internal policies and procedures that are either more stringent or more complete than those of the governmental regulatory system. We also recognize that there are some basic philosophical differences in the policies and procedures utilized by the different operators, and in some cases by the same operating company in its dealings with different drilling contractors.

We believe we have the maturity to deal with the key safety-related issues and to recognize and document the real concerns on both sides of the regulatory regime. Our position as an independent consulting group, at arms' length from either government or industry, puts us in a strong position to concentrate on the real mission, i.e., "To Identify Practical Means of Improving the Safety of Offshore Operations", in the pursuit of this study.

The Royal Commission is, by basic charter, committed to an open assessment process and will publish the findings of the various studies. We will therefore, by agreement, operate in the same open fashion. We urge operators to be as candid as possible with basic information and especially with those critical issues that they feel should be made public in the interests of a healthy industry. This will ensure that the best end results are achieved from this study.

There are four primary areas of safety on which the study is concentrated. These include: Well Control, Lifesaving Equipment and Procedures, Marine Emergency Training, and Marine Procedures. We have developed a questionnaire, enclosed as Attachment #3, that outlines specific topics within these primary areas where we require detailed responses. There are several general areas of interest that focus on specific differences between government regulations and industry policies, and on the contact or communication mechanisms whereby regulations and policies are transmitted and controlled. We would ask operators to respond as to their perspective on these more general issues that are particularly critical to the success of a logical and effective regulatory regime.

We would again urge operators to be as open as possible in their response and we would encourage any constructive criticism that will lead to the improvement of the overall safety regime.

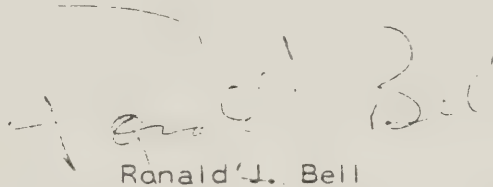
We would also appreciate comments on the role and effectiveness of the industry associations such as CPA/EPOA and CAODC in the communication process between government and industry. We feel this issue will command a great deal of discussion throughout the Commission's review process and it is therefore important to identify industry's position in this study.

We ask for your response to the questionnaire by December 23, 1983. We plan to review the input by January 9, 1984, at which time we would arrange interviews with the various operators to clarify and expand on critical issues. This interview process is necessary to ensure that we have identified the critical elements of the control process, and that we are in fact working toward a realistic assessment of the system. The tentative completion date for the study is February 28, 1984.

The Royal Commission is, in our opinion, seeking a rational assessment of the offshore safety regime. We believe that it is in the best interests of everyone concerned, including resource companies, drilling and ancillary service contractors, as well as consulting groups such as ourselves and National Petroleum and Marine Consultants Ltd., to identify critical concerns and put forth positive suggestions for improvements to the system. This forum is a unique opportunity to provide some constructive input into how we run our industry. Positive response from both sides of the regulatory system, collected and tabled by industry associations and independent consultants working outside the day-to-day control environment, should result in a much healthier, a more simplistic, and most important, a safer operating environment.

We appreciate any support you are prepared to offer by way of response, since the objectivity and usefulness of our final report will depend on the quality of input from industry.

Yours truly,

A handwritten signature in dark ink, appearing to read "Ronald J. Bell", is written over a faint horizontal line. The signature is cursive and somewhat stylized.

Ronald J. Bell

RJB/pp

Attachments

ATTACHMENT #1

Royal Commission on the
Ocean Ranger Marine Disaster

Canada



Commission Royale sur le
Désastre Marin de l'*Ocean Ranger*

Newfoundland/Terre-Neuve

1983 11 14

Mr. Ronald J. Bell
407
617-15th Avenue, SW
Calgary, AB
T2R 0R4

Dear Mr. Bell:

This is to confirm that Ronald J. Bell has been retained by the Royal Commission on the *Ocean Ranger* Marine Disaster to prepare an assessment of the method used and degree to which industry regulates the safety of offshore drilling operations. This study is to be carried out under the Commission's Part Two mandate.

The Royal Commission on the *Ocean Ranger* Marine Disaster has been given comprehensive Terms of Reference which are divided into two parts.

Part One calls for an extensive investigation into the loss of the drill rig, *Ocean Ranger*. This inquiry has been underway since the Commission was jointly established in March, 1982, by the governments of Canada and Newfoundland and Labrador.

Part Two of the Commission's Terms of Reference call for it to "inquire into, report upon, and make recommendations with respect to" both the marine and drilling aspects of practices and procedures in respect of Eastern Canadian Offshore drilling operation and to a number of specific matters relating to drilling units operating offshore.

To address the Part Two Terms of Reference, the Commission is undertaking a study program the goal of which is to identify practical means of improving the safety of Eastern Canada Offshore drilling operations.

.../2

Commissioners/Commissaires

Chief Justice T. Alexander Hickman, Chairman/Président
The Honourable Gordon A. Winter, O.C., Vice Chairman/Vice-Président
Fintan J. Aynward, Q.C.
Ian Furst, P. Eng.
M.O. Morgan, C.C.
N. Bruce Pardy, P. Eng.

Counsel/Counselier Juridique

Leonard A. Martin, O.C.
David B. Orsborn

Commission Secretary/Secrétaire de la Commission

David M. Grenville

Fort William Building

po. box/c.p. 2400 St. John's, Newfoundland/St. Jean, Terre-Neuve; A1C 6G3-709-772-4319, telex 016-4720

Edifice Fort William

The subject of study is offshore exploration and delineation drilling operations, including service and supply (marine and air) activities.

The issue is human safety. Property safety will be considered to the extent it affects human safety.

The Part Two Study Plan will include the following areas:

1. Environment

This study area will address the physical environment conditions within which offshore drilling operations take place. Emphasis will be placed on severe and limiting conditions and their detection or prediction.

2. Regulation

This study area will address the manner in which offshore drilling operations are controlled by rules, regulations, and guidelines and their relationship to safety. Emphasis will be on government control, but included will be industry control.

3. Design

This study area addresses the process of conception, design, construction, classification, and certification of structures and equipment used in offshore drilling operations. It will include consideration of operational limitations and upkeep requirements.

4. Safety

This study area focuses on elements of offshore drilling operation directly related to establishment and maintenance of personnel safety. It includes the identification of levels of risk for various activities. It deals with workplace health and safety. In particular it will address systems to ensure survival and minimize injury resulting from unplanned events. Special focus will be given to systems of evacuation, survival and recovery, including self help as well as external assistance.

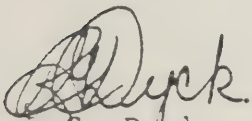
5. Training

To evaluate and, as appropriate, recommend improvements to operational marine and safety training for the Eastern Canadian offshore petroleum industry and related sectors.

This letter of confirmation, along with the Terms of Reference for this study should be presented to parties from which you will solicit information and assistance.

If you have any questions or concerns, please do not hesitate to call me at 772-4319.

Yours truly,

A handwritten signature in dark ink, appearing to read 'R. G. Dyck', with a stylized, cursive script.

R.G. Dyck
Studies Manager

/attach.

RGD/jmg

ATTACHMENT #2

INDUSTRY MANAGEMENT OF REGULATIONS

OBJECTIVE

To assess the method used and the degree to which operators and drilling contractors regulate the safety of Eastern Canada offshore drilling operations.

SCOPE

In addition to government imposed safety-related regulations, the operators and drilling contractors currently active on the Eastern Canada offshore have internal safety-related policies and operating requirements. The study will compare the policies and operating procedures of these companies to the government regulations.

The study will investigate the method whereby the operator ensures that the drilling contractor and other contractors comply to government safety regulations and to the operator's safety standards.

The method by which the drilling contractor ensures that all personnel on the drilling unit comply with government safety regulations and the drilling contractor's safety standards will be investigated.

The points of contact between the regulatory agencies and the operators and drilling contractors for the transmittal of safety-related requests, proposals, or regulatory requirements will be determined. The points of contact between the operator and the individual contractors for the transmittal of regulatory and operator safety requirements will also be determined.

ATTACHMENT #3

INFORMATION REQUIREMENTS
ROYAL COMMISSION ON THE OCEAN RANGER MARINE DISASTER
INDUSTRY MANAGEMENT OF REGULATIONS

INFORMATION REQUIREMENTS

ROYAL COMMISSION ON THE OCEAN RANGER MARINE DISASTER

INDUSTRY MANAGEMENT OF REGULATIONS

Four specific topic areas have been identified in the study outline that require a detailed response on your company's policies and internal procedures. We recognize that your policies may be more stringent, or complete, than those prescribed in the regulations. We also recognize that your policies and procedures may differ from the current regulations because of fundamental disagreement with the spirit of the regulations, or because the regulations are unclear, incomplete or overlapping. We would ask that you also respond to these four categories by identifying those items where your current policies or procedures differ from the regulations.

Eight general topic areas have been identified where we require a more philosophical response on your company's policies and procedures. We would appreciate it if you could use specific regulatory examples to illustrate these general points if possible. Some of these topics are directly related to the activities carried out under the control of the drilling contractors. We will be conducting a similar information gathering process with the Drilling Contractors and will utilize the detailed response from them in the overall assessment process. It would be helpful, however, if you would provide your comments on those critical issues that fall under the responsibility of the contractors' operations that directly affect your dealings with the the government agencies.

I. SPECIFIC SAFETY ISSUES

A. Well Control Equipment and Procedures

This category includes all equipment and procedures relating to the control of the well including the following:

- Well control equipment. (BOP system, wellhead and casing design, drilling fluid system, etc.)
- Well control procedures. (Formation pressure detection, volume of drilling fluid, gas content measurement, directional surveys, well testing, kick detection, well control techniques, etc.)
- Requirements for well control drills.
- Requirements for pressure testing.
- Equipment specification and testing documentation.
- Equipment inspection, frequency, and type.
- Formal training in well control.

B. Lifesaving Equipment and Procedures

This category includes both the marine and industrial lifesaving equipment, required on MODUs for the protection and safety of the onboard personnel.

Marine lifesaving equipment includes all items required to facilitate survival in a marine environment in the case of loss of a helicopter, loss of a supply vessel, or the loss of the drilling unit. This would include:

- Life boats, life rafts and launching systems.
- Life jackets, life buoys and immersion suits.
- Communication and signalling equipment.
- Recovery nets and pickup equipment.

Industrial lifesaving equipment includes all items required for the safety of onboard personnel such as:

- Fire fighting equipment and systems.
- Breathing apparatus.
- Hoisting equipment.
- Medical facilities.
- Accommodation design and layout.
- Emergency power and lighting systems.
- Communication systems.

Marine and industrial lifesaving procedures include:

- Basic operational procedures including deployment and operation of support vessels and standby vessels.
- Communication requirements with shore base facilities and with support craft.
- Frequency and type of drills.
- Frequency and types of inspections.
- Communication of procedures and roles to onboard personnel.
- Transfer of personnel.

C. Marine Emergency Training Requirements

This section includes the personnel training required to deal with emergencies related to the marine environment, to facilitate self survival and/or the rescue of others in the event of loss of a helicopter, loss of a supply vessel, or loss of the drilling unit.

Marine Emergency Training Requirements have been the subject of several studies over the past two years. The most recent being that carried out by the EPOA/APOA Safety Committee. In order to avoid duplication of efforts, we would ask that you respond to this key issue by defining the major differences between the systems currently advocated by the governmental agencies and those policies and procedures which you feel are most effective, given the specific environment you are operating in and the specific equipment you are using in that operation.

D. Marine Procedures and Systems

This section includes the procedures and standards related to the operation and safety of MODUs in the marine environment. This would include:

- Standards and procedures for navigation.
- Standards and procedures for stability.
- Standards and procedures for mooring.
- Standards and procedures for avoidance of collision.
- Basic philosophy regarding chain of command and ultimate authority onboard MODUs.
- Basic operational procedures governing the movement of support and standby vessels.

II. GENERAL REGULATORY ISSUES

A. The methods whereby the operator ensures that his drilling contractor and ancillary contractors comply with government regulations and with the operator's internal policies should be identified in terms of:

- Contractual commitments.
- Written instructions.
- Verbal instructions.
- Monitoring procedures.

B. The methods whereby the drilling contractor ensures that onboard personnel comply with government regulations, operator's internal policies and contractor's standards should be identified in terms of:

- Station bills and written instructions.
- Briefing procedures.
- Monitoring procedures.

C. The points of contact in the operator's organization responsible for the transmission of government regulations and operator's policies to the drilling contractor and ancillary contractors should be identified and linked together.

The points of contact in the operator's organization which ensure that these regulations and policies are being met should also be identified and linked.

D. The points of contact in the drilling contractor's organization responsible for the transmission of government regulations, operator's policies and contractor's standards to onboard personnel should be identified. The points of contact in the drilling contractor's organization which ensures that the regulations, policies and standards with respect to onboard personnel are being met should also be identified.

E. The points of contact in the operator's and drilling contractor's organizations that are responsible for the reception of, and response to, safety-related requests, proposals and requirements from the regulatory agencies should be identified and linked together.

F. The method whereby the various contact points in the operator's organization, the contractor's organization and the government agencies interact within the regulatory system should be outlined.

G. The pros and cons associated with the offshore drilling industry's two basic command hierarchies, one being the marine-oriented system, as developed by the European contractors, the other being the drilling-oriented system utilized by many of the North American contractors.

H. We would appreciate your comments on the effectiveness of the industry associations such as the CAODC in dealing with the review and development of regulatory issues in their position as a communication link between industry and the government agencies.

DRAFT LETTER

TO

CONTRACTORS

Attention:

RE: ROYAL COMMISSION ON THE OCEAN RANGER MARINE DISASTER
INDUSTRY MANAGEMENT OF REGULATIONS

Dear Sir:

We have been retained by the Royal Commission on the Ocean Ranger Marine Disaster to prepare an assessment of the method used and degree to which industry regulates the safety of offshore drilling operations. The Chairman of the Royal Commission, Chief Justice T. Alexander Hickman, has outlined the terms of reference of the Commission in a letter to those resource companies currently operating offshore Eastern Canada, and has asked for their assistance in gathering information for a number of studies.

Attachment #1 is a copy of a letter from Mr. R.G. Dyck, Studies Manager for the Commission, which outlines the terms of reference and identifies those areas of specific interest in which the Commission is concentrating its efforts during Part 2 of its mandate. The prime goal of this second phase, as identified in Mr. Dyck's letter, is "To Identify Practical Means of Improving the Safety of Eastern Canada Offshore Drilling Operations". Attachment #2 is an outline of the terms of reference for the study being carried out by our group.

...2

The Royal Commission is being advised by advisory committees, which include members from the resource and marine industries, and as a result is undertaking a thorough analysis not only of industry safety procedures, but also of the governmental regulatory regime. This stipulation on the part of the Commission to review both industry and government, is amplified by the fact that a parallel study to assess the effectiveness of the organization and management structure whereby governments regulate the safety of Eastern Canada offshore drilling operations, is being carried out concurrently. These two studies are mirror images in that they are essentially looking independently into the safety control systems on both sides of the regulatory regime. We are in close contact with Dr. Wilson Russell of National Petroleum and Marine Consultants, who are conducting the second study, and in fact, are collaborating with Dr. Russell on the study outlined herein.

The Commission's approach to the various studies allows for an evaluation of the key issues affecting offshore safety in an atmosphere at arms' length from the day-to-day activities of industry and government. We therefore believe that this particular study provides an excellent opportunity to present industry's side of the regulatory story in a forthright and unbiased fashion. We have followed the scope and direction of the Royal Commission in attempting to develop a study plan that will enable us to gain a true perspective of the regulatory process as it affects the Operator's and Contractor's ability to conduct operations in a safe fashion.

There have been a large number of studies initiated by the Royal Commission over the past months and the resultant call on information from the operators and contractors may create a significant work load. The Commission has recommended that the various consulting groups work together in conducting these studies to keep the work load on the part of industry and government to an acceptable level, while still achieving maximum benefit from the process. The Commission and the consultants appreciate the amount of work required in responding to these requests and are endeavoring to avoid duplication as much as possible.

The Royal Commission plans to present the results of the various studies in a conference scheduled for August, 1984. This is a further indication of the Royal Commission's desire to achieve a fair and open assessment of the state of the safety control system.

The individuals who will be responsible for this study into Industry Management of Regulations are outlined below:

The project will be managed by Mr. Ronald J. Bell, who has extensive experience in the petroleum industry having spent 23 years in various aspects of onshore and offshore drilling activities. His offshore experience was gained working off the Canadian East Coast, in the Beaufort Sea, offshore Australia, and in

the North Sea. Mr. Bell has held positions with varying degrees of technical, operational, and managerial complexity with two multinational oil companies, a Canadian independent oil company and an international offshore drilling contractor. His last position was that of Vice President, Drilling, with the Canadian national oil company, Petro-Canada. He has worked with industry committees on safety and the physical environment in Europe and Canada.

Mr. Donald B. Webster has extensive drilling engineering, operations and management experience built up over 27 years in the drilling industry in Western Canada, the Beaufort Sea, the High Arctic, the Canadian East Coast, South America and the United States. Mr. Webster spent 23 years with the Esso organization in various engineering and operating positions with the company, as well as with Imperial Oil's company-owned drilling contracting organization. Mr. Webster's last assignment was General Manager, Operations, with Petro-Canada's drilling department. He was responsible for the company's extensive land and offshore drilling operations. Mr. Webster has been active on industry committees on the standardization of well control equipment, systems and regulations.

We will be assisted in the study by Dr. Wilson E. Russell of National Petroleum and Marine Consultants Ltd. of St. John's, Newfoundland. Dr. Russell has extensive experience in the petroleum industry on the Canadian East Coast, the Eastern Arctic and the Beaufort Sea. He has conducted research, performed and managed many consulting studies, and has been directly involved in the development and administration of government regulations. He has chaired advisory committees and liaised with national and international regulatory and industry bodies.

We feel that the combination of hands on industry and government experience represented in this association, along with the considerable international operations exposure to regulatory systems in both highly government-controlled and in self-regulated systems, will enable the team to make a fair and independent assessment of the industry's safety control regime.

The team's basic approach to the study will be to concentrate on general topics, supported by detailed issues from both positive and negative aspects. We recognize that generally most contractors have developed internal policies and procedures that are either more stringent or more complete than those of the governmental regulatory system. We also recognize that there are some basic philosophical differences in the policies and procedures utilized by different contractors.

We believe we have the maturity to deal with these key safety-related issues and to recognize and document the real concerns on both sides of the regulatory regime. Our position as an independent consulting group, at arms' length from either government or industry, puts us in a strong position to concentrate on the real mission, i.e., "To Identify Practical Means of Improving the Safety of Offshore Operations", in the pursuit of this study.

The Royal Commission is, by basic charter, committed to an open assessment process and will publish the findings of the various studies. We will therefore, by agreement, operate in the same open fashion. We urge contractors to be as candid as possible with basic information and especially with those critical issues that they feel should be made public in the interests of a healthy industry. This will ensure that the best end results are achieved from this study.

There are four primary areas of safety on which the study is concentrated. These include: Well Control, Lifesaving Equipment and Procedures, Marine Emergency Training, and Marine Procedures. We have developed a questionnaire, enclosed as Attachment #3, that outlines specific topics within these primary areas where we require detailed responses. There are several general areas of interest that focus on specific differences between government regulations and industry policies, and on the contact or communication mechanisms whereby regulations and policies are transmitted and controlled. We would ask contractors to respond as to their perspective on these more general issues that are particularly critical to the success of a logical and effective regulatory regime.

We would again urge contractors to be as open as possible in their response and we would encourage any constructive criticism that will lead to the improvement of the overall safety regime.

We would also appreciate comments on the role and effectiveness of the industry associations such as CPA/EPOA and CAODC in the communication process between government and industry. We feel this issue will command a great deal of discussion throughout the Commission's review process and it is therefore important to identify industry's position in this study.

We ask for your response to the questionnaire by December 23, 1983. We plan to review the input by January 9, 1984, at which time we would arrange interviews with the various contractors to clarify and expand on critical issues. This interview process is necessary to ensure that we have identified the critical elements of the control process, and that we are in fact working toward a realistic assessment of the system. The tentative completion date for the study is February 28, 1984.

The Royal Commission is, in our opinion, seeking a rational assessment of the offshore safety regime. We believe that it is in the best interests of everyone concerned, including resource companies, drilling and ancillary service contractors, as well as consulting groups such as ourselves and National Petroleum and Marine Consultants Ltd., to identify critical concerns and put forth positive suggestions for improvements to the system. This forum is a unique opportunity to provide some constructive input into how we run our industry. Positive response from both sides of the regulatory system, collected and tabled by industry associations and independent consultants working outside the day-to-day control environment, should result in a much healthier, a more simplistic, and most important, a safer operating environment.

We appreciate any support you are prepared to offer by way of response, since the objectivity and usefulness of our final report will depend on the quality of input from industry.

Yours truly,

A handwritten signature in dark ink, appearing to read 'Ronald J. Bell', with a stylized flourish at the end.

Ronald J. Bell

RJB/pp

Attachments

ATTACHMENT #1

Royal Commission on the
Ocean Ranger Marine Disaster

Canada

Commission Royale sur le
Désastre Marin de l'*Ocean Ranger*

Newfoundland/Terre-Neuve



1983 11 14

Mr. Ronald J. Bell
407
617-15th Avenue, SW
Calgary, AB
T2R 0R4

Dear Mr. Bell:

This is to confirm that Ronald J. Bell has been retained by the Royal Commission on the *Ocean Ranger* Marine Disaster to prepare an assessment of the method used and degree to which industry regulates the safety of offshore drilling operations. This study is to be carried out under the Commission's Part Two mandate.

The Royal Commission on the *Ocean Ranger* Marine Disaster has been given comprehensive Terms of Reference which are divided into two parts.

Part One calls for an extensive investigation into the loss of the drill rig, *Ocean Ranger*. This inquiry has been underway since the Commission was jointly established in March, 1982, by the governments of Canada and Newfoundland and Labrador.

Part Two of the Commission's Terms of Reference call for it to "inquire into, report upon, and make recommendations with respect to" both the marine and drilling aspects of practices and procedures in respect of Eastern Canadian Offshore drilling operation and to a number of specific matters relating to drilling units operating offshore.

To address the Part Two Terms of Reference, the Commission is undertaking a study program the goal of which is to identify practical means of improving the safety of Eastern Canada Offshore drilling operations.

.../2

Commissioners/Commissaires

Chief Justice T. Alexander Hickman, Chairman/Président
The Honourable Gordon A. Winter, O.C., Vice Chairman/Vice Président
Finlay I. Ayrward, Q.C.
Ian Furst, P. Eng.
M.O. Morgan, C.C.
N. Bruce Pardy, P. Eng.

Counsel/Conseiller juridique

Leonard A. Martin, Q.C.
David B. Osborn

Commission Secretary/Secrétaire de la Commission

David M. Grenville

Fort William Building
p.o. box/c.p. 2400 St. John's, Newfoundland/St. Jean, Terre-Neuve; A1C 6G3 • 709 • 772-4319, telex 016-4720

Edifice Fort William

The subject of study is offshore exploration and delineation drilling operations, including service and supply (marine and air) activities.

The issue is human safety. Property safety will be considered to the extent it affects human safety.

The Part Two Study Plan will include the following areas:

1. Environment

This study area will address the physical environment conditions within which offshore drilling operations take place. Emphasis will be placed on severe and limiting conditions and their detection or prediction.

2. Regulation

This study area will address the manner in which offshore drilling operations are controlled by rules, regulations, and guidelines and their relationship to safety. Emphasis will be on government control, but included will be industry control.

3. Design

This study area addresses the process of conception, design, construction, classification, and certification of structures and equipment used in offshore drilling operations. It will include consideration of operational limitations and upkeep requirements.

4. Safety

This study area focuses on elements of offshore drilling operation directly related to establishment and maintenance of personnel safety. It includes the identification of levels of risk for various activities. It deals with workplace health and safety. In particular it will address systems to ensure survival and minimize injury resulting from unplanned events. Special focus will be given to systems of evacuation, survival and recovery, including self help as well as external assistance.

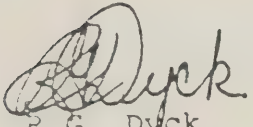
5. Training

To evaluate and, as appropriate, recommend improvements to operational marine and safety training for the Eastern Canadian offshore petroleum industry and related sectors.

This letter of confirmation, along with the Terms of Reference for this study should be presented to parties from which you will solicit information and assistance.

If you have any questions or concerns, please do not hesitate to call me at 772-4319.

Yours truly,

A handwritten signature in dark ink, appearing to read 'R.G. Dyck', is written over the typed name.

R.G. Dyck
Studies Manager

/attach.

RGD/jmg

ATTACHMENT #2

INDUSTRY MANAGEMENT OF REGULATIONS

OBJECTIVE

To assess the method used and the degree to which operators and drilling contractors regulate the safety of Eastern Canada offshore drilling operations.

SCOPE

In addition to government imposed safety-related regulations, the operators and drilling contractors currently active on the Eastern Canada offshore have internal safety-related policies and operating requirements. The study will compare the policies and operating procedures of these companies to the government regulations.

The study will investigate the method whereby the operator ensures that the drilling contractor and other contractors comply to government safety regulations and to the operator's safety standards.

The method by which the drilling contractor ensures that all personnel on the drilling unit comply with government safety regulations and the drilling contractor's safety standards will be investigated.

The points of contact between the regulatory agencies and the operators and drilling contractors for the transmittal of safety-related requests, proposals, or regulatory requirements will be determined. The points of contact between the operator and the individual contractors for the transmittal of regulatory and operator safety requirements will also be determined.

ATTACHMENT #3

INFORMATION REQUIREMENTS

ROYAL COMMISSION ON THE OCEAN RANGER MARINE DISASTER

INDUSTRY MANAGEMENT OF REGULATIONS

INFORMATION REQUIREMENTS

ROYAL COMMISSION ON THE OCEAN RANGER MARINE DISASTER

INDUSTRY MANAGEMENT OF REGULATIONS

Four specific topic areas have been identified in the study outline that require a detailed response on your company's policies and internal procedures. We recognize that your policies may be more stringent, or complete, than those prescribed in the regulations. We also recognize that your policies and procedures may differ from the current regulations because of fundamental disagreement with the spirit of the regulations, or because the regulations are unclear, incomplete or overlapping. We would ask that you also respond to these four categories by identifying those items where your current policies or procedures differ from the regulations.

Eight general topic areas have been identified where we require a more philosophical response on your company's policies and procedures. We would appreciate it if you could use specific regulatory examples to illustrate these general points if possible. Some of these topics are directly related to the activities carried out under the control of the operators. We are conducting a similar information gathering process with the Operators and will utilize the detailed response from them in the overall assessment process. It would be helpful, however, if you would provide your comments on those critical issues that fall under the responsibility of the operators that directly affect your dealings with the government agencies.

I. SPECIFIC SAFETY ISSUES

A. Well Control Equipment and Procedures

This category includes all equipment and procedures relating to the control of the well including the following:

- Well control equipment. (BOP system, wellhead and casing design, drilling fluid system, etc.)
- Well control procedures. (Formation pressure detection, volume of drilling fluid, gas content measurement, directional surveys, well testing, kick detection, well control techniques, etc.)
- Requirements for well control drills.
- Requirements for pressure testing.
- Equipment specification and testing documentation.
- Equipment inspection, frequency, and type.
- Formal training in well control.

B. Lifesaving Equipment and Procedures

This category includes both the marine and industrial life-saving equipment, required on MODUs for the protection and safety of the onboard personnel.

Marine lifesaving equipment includes all items required to facilitate survival in a marine environment in the case of loss of a helicopter, loss of a supply vessel, or the loss of the drilling unit. This would include:

- Life boats, life rafts and launching systems.
- Life jackets, life buoys and immersion suits.
- Communication and signalling equipment.
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Industrial lifesaving equipment includes all items required for the safety of onboard personnel such as:

- Fire fighting equipment and systems.
- Breathing apparatus.
- Hoisting equipment.
- Medical facilities.
- Accommodation design and layout.
- Emergency power and lighting systems.
- Communication systems.

Marine and industrial lifesaving procedures include:

- Basic operational procedures including deployment and operation of support vessels and standby vessels.
- Communication requirements with shore base facilities and with support craft.
- Frequency and type of drills.
- Frequency and types of inspections.
- Communication of procedures and roles to onboard personnel.
- Transfer of personnel.

C. Marine Emergency Training Requirements

This section includes the personnel training required to deal with emergencies related to the marine environment, to facilitate self survival and/or the rescue of others in the event of loss of a helicopter, loss of a supply vessel, or loss of the drilling unit.

Marine Emergency Training Requirements have been the subject of several studies over the past two years. The most recent being that carried out by the EPOA/APOA Safety Committee. In order to avoid duplication of efforts, we would ask that you respond to this key issue by defining the major differences between the systems currently advocated by the governmental agencies and those policies and procedures which you feel are most effective, given the specific environment you are operating in and the specific equipment you are using in that operation.

D. Marine Procedures and Systems

This section includes the procedures and standards related to the operation and safety of MODUs in the marine environment. This would include:

- Standards and procedures for navigation.
- Standards and procedures for stability.
- Standards and procedures for mooring.
- Standards and procedures for avoidance of collision.
- Basic philosophy regarding chain of command and ultimate authority onboard MODUs.
- Basic operational procedures governing the movement of support and standby vessels.

II. GENERAL REGULATORY ISSUES

A. The methods whereby the operator ensures that his drilling contractor and ancillary contractors comply with government regulations and with the operator's internal policies should be identified in terms of:

- Contractual commitments.
- Written instructions.
- Verbal instructions.
- Monitoring procedures.

B. The methods whereby the drilling contractor ensures that onboard personnel comply with government regulations, operator's internal policies and contractor's standards should be identified in terms of:

- Station bills and written instructions.
- Briefing procedures.
- Monitoring procedures.

C. The points of contact in the operator's organization responsible for the transmission of government regulations and operator's policies to the drilling contractor and ancillary contractors should be identified and linked together.

The points of contact in the operator's organization which ensure that these regulations and policies are being met should also be identified and linked.

D. The points of contact in the drilling contractor's organization responsible for the transmission of government regulations, operator's policies and contractor's standards to onboard personnel should be identified. The points of contact in the drilling contractor's organization which ensures that the regulations, policies and standards with respect to onboard personnel are being met should also be identified.

E. The points of contact in the operator's and drilling contractor's organizations that are responsible for the reception of, and response to, safety-related requests, proposals and requirements from the regulatory agencies should be identified and linked together.

F. The method whereby the various contact points in the operator's organization, the contractor's organization and the government agencies interact within the regulatory system should be outlined.

G. The pros and cons associated with the offshore drilling industry's two basic command hierarchies, one being the marine-oriented system, commonly utilized by the European contractors, the other being the drilling-oriented system utilized by many of the North American contractors.

H. We would appreciate your comments on the effectiveness of the industry associations such as the CAODC and the CPA/EPOA in dealing with the review and development of regulatory issues in their position as a communication link between industry and the government agencies.

